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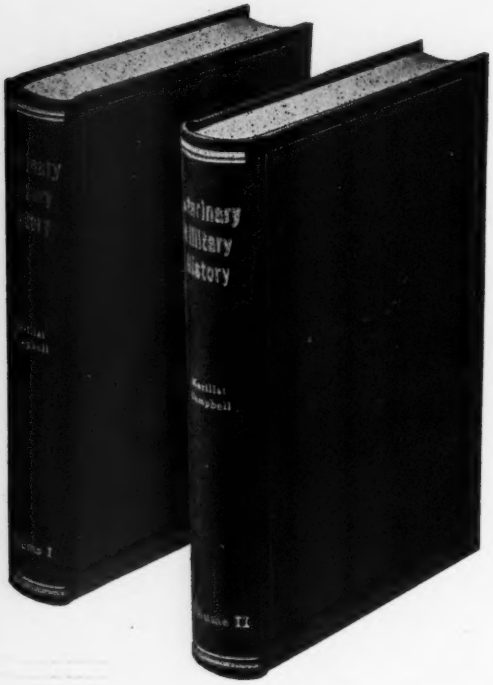

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Guy Stanton Ford

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D. M. Campbell, Editor A. T. Kinsley, Associate Editor
H. J. Mostyn, 1265 Broadway, New York, Eastern Representative

More fur pelts are taken annually in Louisiana than in Canada and Alaska combined.

* * * *

A total of 15,135 cats were destroyed in Toronto in 1936 by the Humane Society. In the same time, 9,684 dogs had their careers of roaming the city streets ended by the society.

* * * *

At the time of the American Revolution (1776) no medical journal had been published in the English language. The first one to be published was the *London Medical Journal,* established in 1781. The *Lancet,* the oldest English medical journal, was established in 1823. The first English veterinary journal, *The Veterinarian,* was established five years later.

* * * *

Hundreds of milkmaids recently gathered in Moscow to receive decorations for increasing the average milk yield of cows. The Lenin decoration, the highest honor the nation can confer, was received by many. These had obtained 925 gallons or more from a single cow in one year. Poultry-men who obtained at least 165 eggs from one hen; pig breeders who got more than six pigs from one sow, and cattle raisers and horse breeders who excelled also were decorated.

Secrecy in medicine and the patents for remedies which remain a passion unto this day, are relics of the long distant past. When the first medical journals quoted from the teachings of the professors they were subjected to scurrilous attacks for daring to enlighten the members of the medical profession that way.

* * * *

Tuberculosis of the Adult a Flare Up of Childhood Disease

From information revealed by 700 autopsies on tuberculous adults whose life long histories he knew, Dr. Henry C. Sweany (*Time,* May 3, 1937) was convinced that in half of them the disease was a flare up of a childhood infection. In the other half the trouble was a secondary infection developed because immunity had broken down.

Whether tuberculosis of the adult human being is a new infection or the fulmination of one contracted in childhood has been one of the unsettled questions of human medicine.

Animal pathologists believe that bovine tuberculous infection contracted in childhood through drinking raw milk products sets the stage for the active tuberculous process of adult life. Anyhow, the campaign waged against bovine tuberculosis is based to a considerable extent upon that hypothesis.

Nutritional Deficiency in a Boar

A two-year-old Duroc Jersey boar, weighing about 300 pounds, in good condition and not crowded in service, would lie around and upon being made to get up, would begin to shake; placing his nose to the ground, he would scoot along four or five feet and go down on his belly and lie still, with the eyes set, for about five minutes, and then he would recover; but would continue to lie down. He had these spells for ten days, then was all right. The spells have not recurred since. What was the cause?—*E. J. W.*, Ill.

Comment: The symptoms enumerated, in my judgment, are indicative of a deficiency, probably of calcium or phosphorus or an unbalance of calcium and phosphorus assimilation, or a vitamin insufficiency. The peculiar action and lying posture were probably assumed because of a sensitivity of the skeletal structure and particularly the joints. The eye condition was probably due to temporary nervous condition also due to an unbalance or deficiency of minerals or vitamins.—*A. T. K.*

The transport equipment of the Royal Canadian Mounted Police on March 31, 1936, consisted of the following: 442 passenger cars, 28 motorcycles, 19 motor trucks, 10 cruisers, 17 patrol boats, 226 saddle horses, 15 team horses and 388 sleigh dogs.

* * * *

A. M. A. Statistics

April 1, 1937, the American Medical Association had 105,460 members. A year ago the membership totaled 101,946.

The income of the association for 1936 was $1,547,218, an increase of $5,000 over the preceding year. The average net paid circulation of the Journal of the A. M. A. during 1936 was 93,301, an increase of 3,300 over the preceding year.

The association publishes six specialty journals and a popular magazine—*Hygeia*. The loss on the publication of the specialty journals during 1936 was $33,821, and the loss on *Hygeia* was approximately $15,000, or less than half the loss on that publication for 1935.

The net income of the association for the year was $113,000.

Milk Analysis and Other Tables*

Milk Analysis	Bitch	Cow	Sheep	Horse	Sow	Human
Water	75.44	87.27	83.57	90.58	83.44	87.58
Fat	9.57	3.68	6.18	1.14	4.55	3.74
Sugar	3.09	4.94	4.17	5.87	3.23	6.37
Soluble salts	.73	0.72	0.93	0.36	1.05	0.30
Casein		2.88	4.17	1.30		0.80
Protein	11.17	3.39	5.15	2.05	7.23	2.01
Normal temperature	100.8	101.4	103.4	100.4	102.2	98.6
Blood pressure	150	166	114	170	170	120
Pulse rate	90-100	45-50	70-80	36-40	70-80	72
Respiration	15-20	12-30	12-20	8-16	10-15	18
Estral cycle	6 months	21 days	17 days	22 days	21 days	28 days
Duration of estrum	1 week	17 hrs.	2 days	6-7 days	3 days	From 8th to
Time of ovulation	1st or 2nd day of estrum	1st day after esrtum	1st or 2nd day after estrum	End of estrum	2nd day of estrum	16th day after beginning of menstruation
Period of gestation	62 days	282	150	340	115	270
Specific gravity of urine	1.025	1.032	1.030	1.040	1.012	1.020
Reaction of urine	acid	alkaline	alkaline	alkaline	acid or alkaline	acid

* Data supplied by E. A. Hewitt, Ames, Ia.

Another Reason for State Meat Inspection

Refrigerated locker plants, first built in the Northwest as an experiment six or seven years ago, have "caught on" in rural communities, and their numbers are increasing rapidly, particularly west of the Mississippi.

There are now in operation—according to a Chicago engineer specializing in their design and construction—2,000 of these plants. Within a few years, he predicts, there will be one in every rural trading center. The average number of lockers per plant is 400. There are therefore 800,000 individual lockers now available. A locker has storage capacity for 350 pounds of frozen products. It is estimated that already approximately 200,000,000 pounds of meat passes through them in a year.

Lockers rent for $10 a year and according to studies made by three agricultural colleges a locker saves a family, on the average, a hundred dollars a year on its food bill.

Locker plants are built for the convenience of farm dwellers principally. They are designed for storage in small lockers of meats, fruits and vegetables in the frozen state. Each renter of a locker has access to it at all times for withdrawal of product.

Locker plants employ butchers who—in addition to slaughtering and dressing livestock for those who desire this service—chill the carcasses, break them down into consumer cuts, wrap the cuts, freeze them, render lard and even manufacture sausage.

They may become numerous enough, and eventually serve enough people, to affect established livestock and meat distribution methods. Many Farm Bureau organizations are promoting locker plants; in some instances building them, but more frequently taking over ice plants crowded to the wall by electric refrigeration or adding them as side lines to creameries or already established cold storage plants.

Any considerable distribution of meat through small local slaughtering and processing plants into which refrigerated locker plants might develop would emphasize lack of proper ante-mortem and post-mortem inspection to determine health of animals slaughtered and their fitness for human food.

This feature of locker plant development needs little comment. Its seriousness is generally apparent. Undoubtedly this situation will have to be corrected eventually by state or local regulation. —Excerpted from *The National Provisioner.*

* * * *

Nutritional deficiencies are an important factor in bringing about degenerative diseases.—*League of Nations Health Committee.*

* * * *

There is no longer any need for administering or prescribing the more toxic hypnotic drugs. Scientific research has produced a number of highly efficient hypnotics with a wide margin of safety.—*Clin. Med. & Surg.*

* * * *

Calcium Gluconate and Blood Calcium

In the debate over the action of calcium gluconate in the treatment of milk fever, one can invoke diversified ideas as to the method by which it cures the disease. Heubner (*Zeit. Exper. Med.*, 1936) demonstrated that toxic doses of calcium gluconate increased the ultrafilterable blood phosphorus and decreased the blood calcium. On the other hand, when calcium gluconate and phosphates were given simultaneously, the colloidal calcium was raised to a higher level than when calcium gluconate in medicinal amounts was given alone.

In hypercalcemia and hyperphosphatemia the major portion of the blood calcium may be a phosphate salt and only a very small fraction fixed in the protein molecules where alone calcium serves its purpose.

The conclusion drawn from this work was that in chemical analyses for totals, the amounts of calcium or phosphorus found have no particular bearing upon the amount of calcium available to the organism. In other words, hypo- or hypercalcemia and hypo- or hyperphosphatemia have neither the etiologic nor therapeutic significance too generally attributed to them.

Danger Ahead

It is high time that Farm Bureaus, County Agents, and others interested in the perpetuation and promotion of our livestock industry were taking notice of one of the most serious menaces that has ever threatened our livestock industry, that is the present and growing shortage of trained veterinarians.

In Missouri and Illinois there are approximately one half the number of veterinarians that were in practice in those states 20 years ago. At the present time there are not enough competent veterinarians in either state to properly report and control any outbreak of a serious disease among livestock. The decrease in numbers of trained veterinarians is continuous and at the present rate these states will be without a competent veterinary service within another 20 years.

During September, October and November of 1936, 175 of the 600 veterinary practitioners in Illinois reported 1600 outbreaks of diseases of an infectious nature. Many of these were dangerous to human health and life. Unless some steps are taken to rebuild the veterinary profession, various infectious and parasitic diseases will destroy our live stock profits as insects have already cut short those of our orchards.

In 1917, the practicing veterinarians of Missouri, with the aid of 14 Federal men, detected and controlled, at a nominal cost, 2476 incipient outbreaks of hog cholera in 102 counties, and prevented a loss of from six to seven million dollars. In 1915, practicing veterinarians along the state's border, contacted every farmer on the state line and, together, they successfully guarded our state against the introduction of foot-and-mouth disease. One man from the infected territory in Illinois crossed the Mississippi river at Cairo with a cow and three calves. Before he reached the farm to which he was moving, two telegrams were received by the State Veterinarian concerning his case. A shipment of 105 cattle to Galt, Missouri, crossed foot-and-mouth-disease territory in Iowa. When the train arrived the pens were already locked and quarantined by a local practicing veterinarian. The Legislature authorized the State Veterinarian to spend $5,000 if necessary to keep the disease out of the state. The total cost was $743.

There is no adequate veterinary organization in Missouri today to cope with a serious outbreak of disease among livestock, because large sections of the state are without any trained veterinary service. The situation constantly grows more dangerous.

After the revolution the Russians overlooked the necessity of a competent veterinary organization. Their livestock industry was practically ruined and famine resulted. Glanders destroyed their horses until they could not produce a sufficient wheat crop.

It was reliably reported that there were 400 patients in the hospitals at Moscow alone who died of glanders. After it was almost too late, the Russian Government established 25 veterinary colleges at which 12,000 students are in training for disease control work. The Soviet must now educate a force of veterinarians to control livestock diseases and rebuild its livestock industry. As a result of its oversight in not providing a veterinary organization for the control of animal diseases, Russian prosperity has been set back 20 years, during which time the masses of her people have been frequently on the border of starvation.

It will take at least 15 years to build the veterinary profession in Missouri up to what it was in 1915, when the big outbreak of foot-and-mouth disease occurred. Farmers of Missouri cannot afford to wait much longer before starting to rebuild the veterinary profession of this state.—D. F. L.

Rickets?

What is the probable cause of paralysis in a calf three months of age, sucking cow and fed ground oats and timothy hay? Still eats well and does not appear at all sick. —*E. J. W., Ill.*

Sanitary Milk Control in Germany

The purpose of the sanitary milk control is to insure that the consumers obtain milk which is as free from germs as possible and entirely free from noxious qualities of any kind. The proper foundation for sanitary control in Germany was laid by the National Milk Law (of July 31, 1930), on which the governments of the various states have based their individual decrees. These decrees are enforced by a control exercised through the sanitary police. The boards representing the milk producers are making every effort, by instruction and advice, to enable the dairy industry to comply with the legal provisions.

Apart from pasteurized milk there is a considerable amount of raw milk of various qualities sold in Germany. The "certified milk" must come up to the highest quality requirements. Next comes the so-called "grade milk". Both sorts of milk may be sold only in bottles, except in cases where heavy consignments are delivered to large consumers, as for instance a hospital or to a sanitarium. Cattle producing certified milk are subjected to a monthly veterinary examination, in which samples of milk and, if necessary, of blood and pulmonary mucus are tested. With herds of cattle producing "grade" milk, this examination is required only four times a year. Herds producing raw, unbottled milk are under similar control. The sale of mixed raw milk is strictly limited, but is not entirely forbidden. It is required that "certified" and "grade" milk shall be "individual milk", that is to say, milk produced by only one herd of cattle. The same requirement is made with regard to raw, unbottled drinking milk.

In order to maintain the standards of quality required by law, the Agricultural Board for Nutrition has ordered that the drinking milk should be examined at regular intervals by the "Central Organization of the German Dairy Industry". These examinations are carried out in co-operation with the dairy and veterinary institutes of the Regional Peasant Groups. The object of the dairy institute in making these investigations is to find out such faults in the milk, as for instance, insufficient keeping quality, premature fermentation, oily or impure taste, etc. In all parts of Germany a uniform method is used for these examinations. In addition to these tests there is a determination of the acidity, the specific gravity, the fat content, the bacterial count, the reductase and the catalase. When faults are detected, the dairy establishment from which the milk was supplied is subjected to investigation to ascertain the cause of the defect and to make a recurrence impossible.

The Veterinary Institute for Sanitary Control, to which a part of the samples are sent, employs animal tests as well as microscopic and serological methods of investigation, when examining the milk, to determine the agent of the disease. In the same manner as the dairy institute, it extends its investigations to the sources of supply when faults are detected in the milk.

* * * *

Return of the Horse to Favor in the German Army

"The striking lessons learned by the German Army from the Spanish battlefield cropped out in the military parade in honor of Chancellor Hitler's birthday yesterday," says the Berlin correspondent of the *Evening Standard*, in the April 21st issue of that paper. "According to military observers, and those acquainted with German Army displays since 1935, the fact stood out that the horse has won back his front rank place in the military sphere.

"Contrary to last year's parade when there was no cavalry in evidence, this year there were not only plenty of riders, but the motorized field artillery has been divided up into horse-drawn four- and six-inch batteries, while the machine gun section has also reverted to horses, with twin and single machine gun caissons being animal drawn. This transition is attributed by military observers to be the direct result of German experience on Spanish battlefields where supermotorized outfits were frequently handicapped by mechanical breakdowns. The German Army is thus partially demechanizing its artillery as rapidly as possible." —*The Vet. Rec.*, 18:49, p. 567.

The Author.

Common Digestive Ailments of Dairy Cattle*

By S. L. STEWART,
Olathe, Kansas

The geographical location, climate, weather, type of dairying and varying experience and skill of dairymen affect the incidence of certain diseases of cattle, and a list of what may be the most common and most important diseases in one veterinarian's practice may not fit this description in all respects in another's practice. The digestive ailments of dairy cows and calves discussed in the following pages are those occurring most frequently in my practice in Johnson County, Kansas.

Non-Infectious Diseases of the Digestive Organs

In heavy producing dairy cows, diseases of the digestive organs exceed all other ailments to which this animal is subject, not only in frequency but in economic importance also. Not even mastitis is as common or as fatal or responsible for as much lowered production. A growing tendency on the part of dairymen to avail themselves of veterinary advice is bringing about an improvement in the feeding of dairy animals and a diminution in the number of fatal cases of digestive disturbances but the number of non-lethal attacks of indigestion still remains high, always lowering the milk production, or stunting the growth of calves.

The importance of feeds and feeding in production, health and breeding efficiency in the dairy herd cannot be over stated. But even with the exercise of the best knowledge available in nutritional matters, digestive disturbances still occur, although in lessened number and severity. At times their etiology baffles the most experienced. No opportunity for a systematic post-mortem examination, in fatal cases of digestive disturbance, should ever be passed up by the veterinarian engaged in dairy practice. Autopsies are highly instructive. Upon them success in future cases is built. The findings are sometimes surprising and usually satisfying.

Except for traumatic gastritis most non-infectious disturbances of the digestive organs are due to faulty diet, and we can not except all the traumatic gastrites since a portion of such cases of indigestion are due to carelessness in feeding and still others are primarily due to nutritional deficiencies. Improper feeding, sudden changes in the feed, irregular feeding, innutritious feed or unbalanced rations are in a majority of cases inextricably associated with overloading, impaction, autointoxication dysentery, nutritional deficiency and other digestive disturbances.

The stomach of the ox is a highly complex organ of peculiar arrangement and enormous size. It occupies nearly three-fourths of the abdominal cavity and has a capacity ranging from 25 gallons in very small to 60 gallons in the largest cows. The size depends to a degree also upon the type of feed, whether concentrates or straw for example. It comprises four unequal compartments, differing in size, shape and function. Because of its size, complexity and burdensome functions, the stomach is more often involved in digestive disturbances than are other organs of the digestive system.

The commoner ailments of the first portion of the stomach are impaction, engorgement, overloading and inflation of the

*Presented at an annual meeting of the Illinois Veterinary Medical Association, Springfield, Feb. 18-19, 1937.

rumen. The first three signify an inordinate accumulation of ingesta in the rumen and the latter fermentation of the contents of that organ with a failure of regurgitation, or a rapid evolution of gas due to the nature of the ingesta.

Each case of engorgement should be treated according to the conditions. The desideratum is to unload the rumen as promptly as it is safe to do so. Ordinarily the treatment should begin with a liberal dose of a saline purgative in two quarts of hot water. The saline purgative I employ most frequently is

Gamboge	gr. 60.
Nux vomica	gr. 45
African ginger	gr. 30
Capsicum	gr. 30
Quassia	gr. 14
Magnesium sulph. q.s.	oz. 20

This purgative is not ideal and it should not be repeated. The heavy dose of magnesium sulphate that it contains has a tendency to remove from the body an indefinite amount of calcium. This is undesirable, especially in heavy producing cows, but it has advantages over heavy dosing with a compound containing a large amount of sodium chloride.

Immediately following the administration of the cathartic above mentioned, a hypodermic injection of eserine compound —Ferguson's—should be given. I use the following:

Eserine salicylate	gr. ½
Pilocarpine hydrochloride	gr. 1

In extreme cases and in large cows the eserine compound is repeated in 30 to 45 minutes, depending upon the response to the first injection. The eserine compound is synergistic to the saline cathartic and materially adds to its action. It causes an increase in muscular activity of the entire stomach and intestinal tract and stimulates gastric and intestinal gland activity. It relieves bloat in some cases in 20 to 30 minutes without other treatment. If the bloat is not reduced materially in 30 to 40 minutes repeat the hypodermic injection. The eserine compound stimulates and increases the heart beat. Its action lasts up to 1½ hours. By that time the saline purgative will have begun to act sufficiently to carry the patient along to recovery. Evacuation of the contents of the stomach and bowel will usually be more than normally complete in from six to twelve hours.

In some cases of tympany, palpitation of the heart is marked, and the pulse is frequent and wirey. In such cases the gas should be liberated from the rumen either by stomach tube or trocar, to relieve the pressure on the lungs, before any medication is attempted. If the gas is mixed with the food giving the whole mass a frothy consistency neither the trocar nor the stomach tube is of avail, and, if there is palpitation of the heart and dyspnea, either a rumentomy must be performed at once, or an amount of the contents of the rumen sufficient to relieve the heart and lung pressure must be removed through the use of the Pilgrim's rumen lavage outfit, before medicinal treatment is attempted. In some cases where there are no heart and lung complications it seems to be more desirable to use a large trocar and leave the canula inserted for several hours or even days. Mild antiferments may be introduced at intervals deeply into the contents of the rumen through this canula to hold fermentation in check. In extreme cases eight to twelve ounces of a 50% solution of formalin may be used for this purpose. In addition two ounces of dilute hydrochloric acid in 16 ounces of water may be given three times daily until the appetite is normal.

When recovery is slow in any of the conditions mentioned in the foregoing, complications are prone to occur. They may, within a few hours, change a favorable prognosis to a grave one.

Treatment before and following rumenotomy or Pilgrim's operation should always be symptomatic. Usually a 20 to 30cc dose of camphorated oil is indicated before the operation, and certainly it will do no harm, afterward in any case. After the rumenotomy the saline purgative should be given to flush out the bowels. It should be followed with a carminative, such as the tincture of peppermint or ginger in two

ounce doses well diluted, three times daily as long as necessary. A small amount of easily digested food, good care, quiet, a clean bountiful bed and a blanket should be supplied every case if the weather is cool.

Enteritis

All cases of enteritis in the dairy cow and in the dairy calf are serious, at least potentially, from the onset. A successful treatment consists of ½ gallon of warm mineral oil to which has been added four ounces of bismo-pepsol compound, or bismuth-pepsin compound. It should be administered through a stomach tube into the posterior portion of the esophagus, giving the oil a chance to run through the esophageal groove, without becoming mixed with the contents of the rumen. This should be followed with a two-ounce dose of warm bismo-pepsol compound every two to four hours until conditions are relieved. A warm, dry box stall and a blanket, in cold weather, and a cool, shady place in the summer constitute an essential part of the treatment. By regulating the feed carefully and giving the best of care the patient *may* recover in from two to six days.

Patients showing stupidity or other symptoms of autointoxication, following impaction, engorgement, overloading, overeating, rumenotomy, or enteritis, should receive intravenously 250cc of a 50% dextro-glucose solution. This supplies an immediate source of energy and is a good supportive treatment. Repeat the glucose injection daily if needed. Calcium gluconate solution should not be used when magnesium sulphate has been given as calcium is incompatible with magnesium. In conjunction with the dextro-glucose treatment a diuretic to aid elimination, often materially aids recovery.

A serviceable diuretic elixir which may be obtained from veterinary supply houses is:

Flxt. Buchu .....dr. 8
Flxt. juniper .....dr. 8
Potassium acetate-sat. sol.....oz. 4

This should be divided into four doses and one dose given every two hours.

A two-ounce dose of a saturated solution of potassium nitrate repeated every two hours until diuresis is obtained, gives very satisfactory results and is inexpensive.

Coccidiosis

Coccidiosis in cattle occurs most frequently in young animals. It is caused by the *Eimeria zurnii*. The disease is contracted only by ingesting contaminated feed or water. It is sometimes spread by infested cattle, which have been shipped hundreds of miles, thus starting a new center of infection. The incubation period is approximately three weeks. The mortality is said to vary from 1 to 25% of the affected animals. My experience is that death from coccidiosis is rare if the case is treated before the disease is so far advanced that the animal refuses food. The mortality is high in animals that have reached this stage.

The symptoms are characteristic, the affected animal passes watery, dark greenish, stinking feces at frequent intervals. Two or three days later the feces become mucous, reddish-black and contain clots of blood. After each act of defecation there is straining and in some cases eversion of the mucous membrane of the rectum which is very red. The animal then begins to show colicky pains, the appetite is diminished or in entire abeyance, rumination is suspended, and in lactating cows, milk secretion practically ceases. Most cases are first noted by owners when the animals begin to drop pure blood either in clots or with the watery evacuation of the bowels.

Unless one is familiar with symptoms of coccidiosis in cattle it is advisable to have a laboratory examination made from scrapings of the mucous membrane of the rectal wall, before treatment is attempted.

Satisfactory treatment in early cases is usually obtained by giving the following drench:

Iron sulphate .....dr. 3
Copper sulphate .....dr. 1
Water "coffey hot" q.s. .....qt. 1

It should be repeated once a day for two or three days as needed.

In conjunction with the above treatment, the following seems to be of great value:

Iron sulphate .....oz. 2
Copper sulphate .....oz. 1
Water (warm) q.s. .....cong. 2

Give the entire amount as a high enema, using the hand or arm to completely close the anus, ballooning the posterior part of the colon and the rectum with the solution. Retain the solution for two to three minutes, then allowing the patient to evacuate at will. Repeat once a day for two to three days as needed.

The treatment should be discontinued at the end of the second or third treatment, but the patient should be observed for several days to see that no symptoms of coccidiosis recur. Eating should be encouraged by tempting bran mashes, succulent green feed, etc. Plenty of fresh clean water should be supplied at all time. Coccidiosis is a self-limited disease, if mass reinfection can be avoided.

Prevention is accomplished by removing all unaffected cattle to new pasture or away from other sources of infection. To destroy the cysts, plow up the lots and disinfect the barn, using Lewis lye two pounds to 50 gallons of warm water, as a spray or scrub water. Depend upon rain and sunshine to clean the pastures.

White Scours

White scours is a disease of the digestive tract of young calves. It is of bacterial origin. It is commonest in calves born in the stock yards, on large dairy farms, or in dairy herds heavily infected with Bang's disease. The disease runs a very rapid course, and in a large percentage of cases terminates in death, unless treated soon after the first symptoms appear. The prognosis is extremely grave. White scours should not be confused with diarrhea or scouring due to over feeding or milk fed from dirty containers.

The symptoms of white scours in calves are characteristic. The disease appears in the new-born ranging in age from a few hours to about ten days and lasts from three to about six days. An acute indigestion is always present. A stinking white frothy diarrhea sometimes mixed with streaks of blood is characteristic. The calf becomes weak, the hair rough, the eyes sunken, the belly tucked up and the back slightly arched. The temperature varies up to 106.° F., but drops to subnormal before death. Some cases develop a septicemic form when symptoms of brain affection may be seen. Lung and joint involvements are common complications.

The treatment consists of vaccination with white scour mixed bacterin (bovine), together with a half-ounce of warm bismo-pepsol compound or bismuth-pepsin compound every one to two hours until the diarrheal condition has been relieved. The bismo-pepsol compound should be given with a syringe; never in the milk, as the calf will often refuse to take milk after being forced to drink medicated milk. It should be fed a small quantity of warm milk.

Prevention of white scours on infected farms requires vaccination of all calves on the premises. Vaccinate every calf as quickly as it is born. Tie the navel cord close and cut it. Paint the stump with tincture of iodine and cover with boric acid. In herds where Bang's disease is present and retained afterbirths plentiful, vaccinate the cows for infectious abortion. In seriously infected herds, in addition to the above treatment, the cows should be given white scour vaccine 15 days before parturition and repeat twice at five-day intervals; then treat the calf as already described.

In case of stable infection it is advisable to test the tolerance of a few calves in the herd for any unusual sensitiveness to the bacterial protein contained in the bacterin, as fatal anaphylaxis sometimes occurs from white scour bacterin. It is advisable to have at hand for immediate use, a 1:1,000 solution of epinephrine (dose 0.5cc) or a solution of atropine (dose ¼ gr.). Give intravenously.

Clean up all barns and burn the rubbish; then disinfect and finally bed the calves with new, dry, clean straw daily.

It takes a year to rid most badly infected herds and barns of white scour infection. Prevention of white scours is highly recommended not only to prevent the loss of calves but also because some calves that recover from the disease, never outgrow the stunting it causes.

Recently the direct or indirect transfusion of whole blood (50cc and upwards daily) from the dam to the calf suffering from white scours has been highly lauded. It is a logical treatment, particularly in very young calves, but prevention of course, is the goal to strive for. It can be accomplished by vaccination and disinfection in the manner prescribed.

Common Diarrheas

All other indigestions and diarrheas of calves can usually be controlled easily by regulating the diet. Reduce the feed to one-half the normal amount of milk to which has been added a half pint of lime water. Healthy hand-fed calves should receive one-half pint of lime-water in the milk once a day. Lime sweetens the stomach, is a gastric sedative, an intestinal astringent, lessens the requirement for vitamin D, and assists in building bone and teeth.

The care of healthy bucket raised calves is a problem that confronts most dairymen, who are experiencing trouble with diseases of the digestive organs of their calves, such as calf scours, indigestion, runts and mineral deficiency.

Calf Feeding

Proper care of a calf at birth is necessary, at least to prevent some calf troubles. The calf should be removed from its mother before it has an opportunity to nurse from a dirty udder and placed in a tight, warm shed or barn, with the south side entirely open, unless sub-zero weather prevails. The calf should receive both light and direct sunshine. The stall should be clean and bedded one foot deep with clean straw. As before stated, the navel stump should be painted with tincture of iodine and covered with boric acid, and left exposed to the air to dry. Three to six hours later, the dam with the udder washed clean, should be milked equally from all four quarters, one-half pint from each, and the calf fed with the whole milk. The calf should be fed twice a day and the amount of milk given should be increased gradually with each feed until it receives up to one gallon a day, to which one-half pint of lime water has been added. The lime water should be continued as long as the calf is bucket fed. If the milk is too rich for the calf, cut down on the amount of milk and add hot water to dilute the milk to the right proportion or to about 3% fat. Within a very few days, the calf will begin to eat, then it should have feed.

A roughage feed that proves very satisfactory for young calves, is: All the nice clean prairie hay that the calves will eat. Feed the hay from a rack which is cleaned daily. Give all the calves will eat of shelled whole yellow corn, good whole oats and oil meal, equal parts. When whole grains of corn begin to pass in the droppings, gradually change to mill feed. The idea is to start development of functioning of the rumen as a store house for food as early in life as possible. The following is a properly balanced calf feed, when the ration is changed to milled feed:

100 pounds yellow corn meal
150 pounds ground oats
50 pounds wheat bran
50 pounds linseed meal
2½ pounds vitamineral, or
½ pound of hydrated lime or prepared chalk

Feed all the calves will eat in half an hour, twice a day.

Home Grown Feeds Best

It should be mentioned here that so far as it is practical, the farm is the place to produce the feed for the herd on that farm. It is cheaper, as good as the best and the dairymen has the benefit of knowing that all the feed ground is digestible feed for the calves as well as the cows. Farmers and dairymen should be encouraged to produce and grind all the feed used, if practical. Also, there is less likelihood of allowing good feed to go to waste. Corn fodder and soy bean hay that cannot be put up as ensilage, should be ground up, stalk and all, and sweetened with black-jack molasses, 1 to 10 gallons of water. The sweetened pulp makes excellent feed. It is very nutritious and easily digestible for calves as well as cows. Such feed can be fed with practically no loss of food and certainly much less digestive disturbances than when feeds of unknown and varying composition are purchased for use in the dairy.

State Meat Inspection Modernizes Coast Plants*

CALIFORNIA is a leader among the states in providing meat inspection patterned as nearly as possible after federal regulations. This has resulted in some type of supervision for all but a negligible amount of livestock slaughtered and meat produced in the state.

Three types of inspection prevail. These are federal, state and state-approved municipal inspection. This inspection applies not only to slaughtering but to meat processing. Meat inspection is required throughout the state, the only exemption being in counties having a population of 27,000 or less.

At the close of 1936 there were 193 establishments operating under state inspection and 177 under state-approved municipal inspection. Engaged in this work are 142 state meat inspectors and five supervising inspectors. Inspection is required in 28 counties, but in 11 additional ones having a population under 27,000 inspection is voluntary. In these 39 counties the work is conducted in 134 cities.

Inspection Increases Business

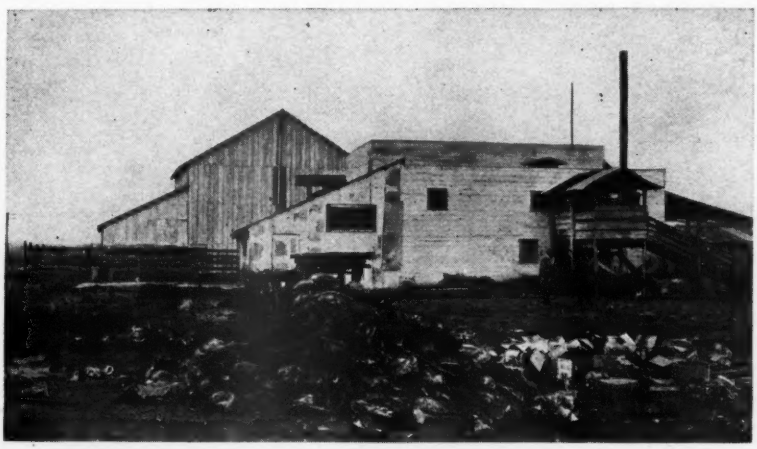
In his report on meat inspection in California at the close of 1936, Dr. A. G. Boyd, assistant chief of the division of animal industry, California Department of Agriculture, said that "it is of interest to observe that there has been a gain in the number and production of meat slaughtering and processing plants, while in other lines of business many concerns were forced to reduce their output or cease operating during recent years of chaotic business conditions."

Standard of sanitation in state-inspected plants reached its height in 1936, Dr. Boyd said. Co-operation of establishment owners and operators was excellent and a large part of the improvements were voluntary.

Plants Are Modernizing

"It is becoming increasingly evident that those engaged in the meat business appreciate more and more the importance of strict

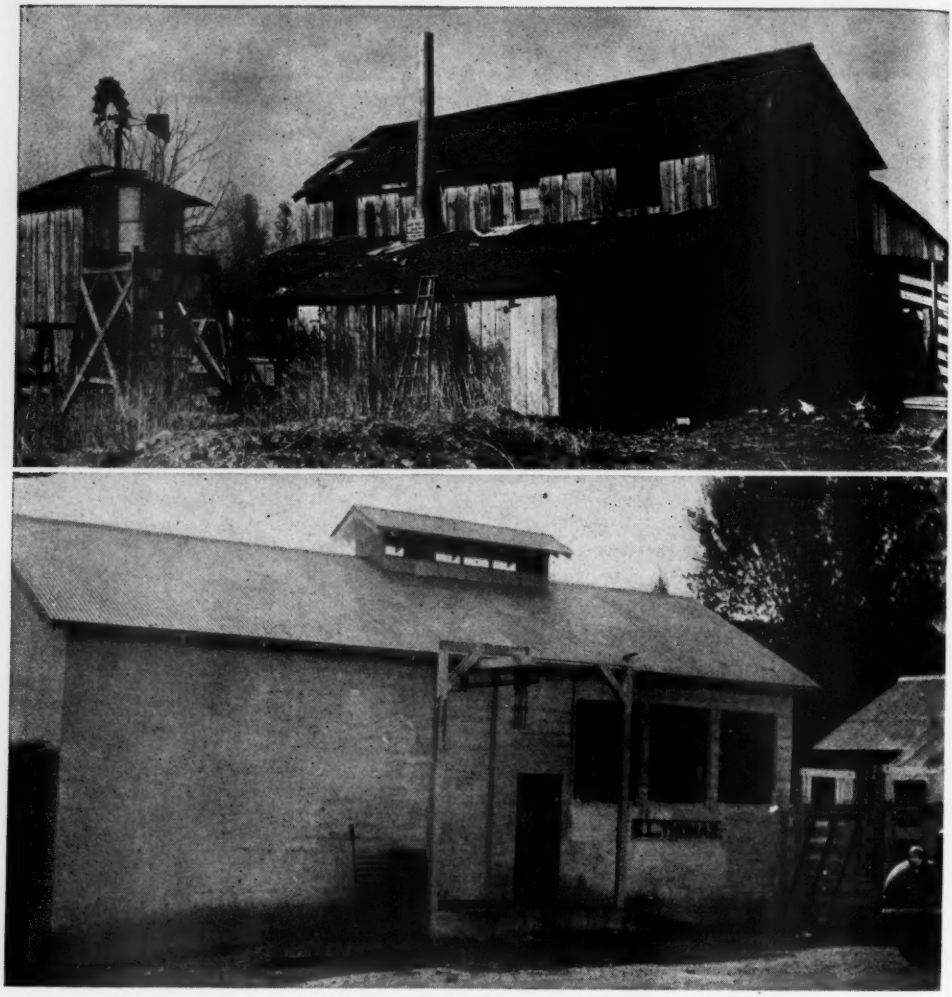
* Reprinted from *The National Provisioner*, May, 1937. Vol. 96, No. 18.



—*Courtesy The National Provisioner.*

NO MORE SIGHTS LIKE THESE IN CALIFORNIA

California state meat inspection does away with unsanitary conditions such as shown here. This plant was condemned and the piles of bones, manure, etc., disappeared.



—*Courtesy The National Provisioner.*

BEFORE AND AFTER

***Above*—Old-fashioned slaughterhouse of type condemned under California state regulations.**
***Below*—Type of new plant approved under state regulations.**

sanitation, not only for the effect on the consuming public but as an asset in producing high quality products," he pointed out. Improvements have not been confined to interiors of plants but to exteriors and surroundings as well.

Much old type equipment that was difficult to keep clean and sanitary has disappeared, wooden equipment being replaced with sanitary metal equipment. During the year many plans and specifications for new structures, as well as additions and alterations, were reviewed by the state authorities.

A sanitary survey of rural slaughterhouses was started in 1935, for the purpose of raising the sanitary standard and operation of all slaughtering establishments located in counties where mandatory meat inspection is not required by law. Supervising inspectors made frequent visits to these

plants and consulted with owners and contractors, outlining improvements to be made. As a result, consumers now are assured that meat produced can be handled in a cleanly manner. "It is pleasing to note that this extensive construction program was done with splendid co-operation from the owners," said Dr. Boyd.

There were 158 slaughterhouses operating without inspection in the 28 counties where meat inspection is not mandatory, and 109 of these were found not to conform with minimum state sanitary requirements due principally to being run down and neglected. In many instances old dilapidated insanitary structures were condemned and abandoned and replaced with modern plants Where the structures permitted, they were remodeled and repaired to bring them up to requirements.

Inspected Slaughter Figures

Trend appears to be toward a decided increase in the number of animals slaughtered under state inspection and a decline in the number slaughtered under state approved municipal inspection. In 1936 slaughter under the different types of inspection in the state was as follows:

Inspection:	Cattle.	Calves.	Sheep.	Hogs.
Federal	257,998	53,762	724,653	538,542
State	650,647	370,498	1,241,889	616,292
State approved municipal	130,119	34,536	434,347	148,907
Total Inspected	1,038,764	458,796	2,400,899	1,303,741
Uninspected[1]	40,000	65,000	175,000	145,000

All trade labels used on meat and meat products must be approved. Statements or designs which are false or misleading as to quality, ingredients, or origin are not permitted. Not only does this service protect the consuming public, but those engaged in meat packing. During the year 696 labels were submitted to the department. Approval was given for 597.

Dr. Boyd discusses some of the problems in finding a sufficient number of qualified veterinarians for inspection purposes, methods taken to meet this situation, means of financing state meat inspection, the work of the meat inspection laboratory maintained in conjunction with the state work and the public relations activities of the department of agriculture in carrying direct to the consumer the advantages of meat inspection.

Need to include the entire state within the inspection regulations is pointed to by Dr. Boyd, because of difficulty of protecting consumers from so-called "hot" meat or meat of questionable origin or ownership which may come in from areas which are not now subject to some responsible type of meat inspection.

[1] Includes estimates of farm slaughter and animals slaughtered in counties having less than 27,000 inhabitants.

* * * *

The Veterinary Service of the Future

If the control of animal diseases is as important as we believe it is, the veterinary practitioners of the future will be subsidized by public funds in regions where the income from private practice is not sufficient to attract thoroughly qualified men. Already in some states private practitioners are employed for the public service in such a way as to add somewhat to their earnings. As a source of revenue sufficient to invite the attention of the type of men now coming out of the veterinary colleges, this service is still too sketchy and insecure.

The Province of Alberta permits municipalities to appropriate a bonus for physicians who locate where a good living from private practice could not be earned. The amount of the bonus varies according to the prospect of earning a living from private clinical work. Something of the same sort seems necessary for veterinarians in parts of our great livestock country in order that the whole people may be protected against the ravages of costly diseases which spread far and wide from centers where a veterinarian cannot make a living from private practice. It would further provide the owners of animals with concurrent veterinary service when needed to aid in the conservation of private property. The cost of the subsidies would be trivial compared to the benefit the nation would derive.

On to Omaha

The Committee on Local Arrangements for the 74th annual meeting of the American Veterinary Medical Association, which is to be held in Omaha, Nebraska, August 17-20, 1937, announce that they are prepared to handle a meeting of any size and have completed arrangements for the comfort, convenience and entertainment of all veterinarians and their families who attend, even though the attendance should exceed that of any previous meeting of this association.

In addition to the discussions by outstanding leaders of the profession, there will be three noted guest speakers at the General Session, August 17th, as follows:

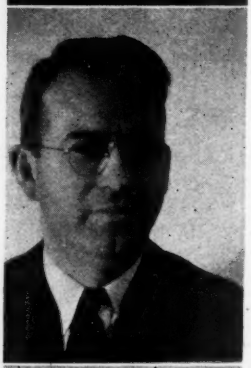
"Food Inspection for the Civilian Conservation Corps," by The Hon. Robert Fechner, Director, Emergency Conservation Work, Washington, D. C.

"The Public Health Program under Title VI of the Social Security Act," by Dr. C. E. Waller, Assistant Surgeon General, U. S. Public Health Service, Washington, D. C.

(*Continued on page 354*)

COL. R. J. FOSTER
President, A.V.M.A.

DR. T. W. MUNCE
Chairman of Sub-Committee on Publicity for the Omaha Meeting, A. V. M. A.



DR. JOHN D. RAY
Member of Sub-Committee on Publicity and in charge of Registration, Omaha Meeting, A.V.M.A.

DR. A. H. QUIN
Member Sub-Committee on Publicity, 74th annual meeting, A.V.M.A., Omaha, Nebr., August 17-20, 1937.

The Officers
of the
American Veterinary Medical Association
and
The Members
of the
Committee on Local Arrangements
invite every veterinarian in America
to attend the
Seventy-Fourth Annual Meeting
Tuesday, August seventeenth to Friday, August twentieth
nineteen hundred thirty-seven
Omaha

"What Can Be Expected from a General Campaign Against Tuberculosis," by Dr. John F. Allen, University of Nebraska College of Medicine, Lincoln, Neb.

CITY OF OMAHA
Executive Office
Dan B. Butler, Mayor

July 12, 1937

To the Veterinarians of the United States and
the Dominion of Canada:

Gentlemen:

Through the courtesy of VETERINARY MEDICINE, it is my privilege to extend a most cordial welcome to the veterinarians of the United States and the Dominion of Canada and their families, on the occasion of the 74th annual meeting of the American Veterinary Medical Association in the City of Omaha, August 17-20, 1937.

We are honored indeed to have been chosen as your convention city. We assure you that it will be a pleasure to extend every hospitality and to do our part in making your visit one to be long and pleasantly remembered.

Sincerely yours,
(Signed) DAN B. BUTLER,
Mayor.

DBB:EJ.

The Committee on Public Relations of the A.V.M.A. has arranged a radio program in connection with the meeting that should aid materially in informing the public of the Missouri Valley country of the importance of veterinary service and the diversified fields in which it may be profitably used. The radio program will include five broadcasts over the Omaha Station WOW, three over the Lincoln Station KFAB and probably a number of others over some Iowa and other Nebraska stations.

Every veterinarian owes himself at least one interval in the year when he gets away from his work, be it practice, teaching, research, public health work or whatever his field. Can he do better on such an occasion than to take himself off to the place where matters of importance to his profession are being discussed and where nearly everyone of importance is on hand to take part in the discussion?

That place, this year, will be Omaha the third week in August.

Campaign Against Trichinosis

To acquaint swine producers more fully with the need to prevent infestation of their hogs with trichinae, the U. S. Department of Agriculture is sponsoring a program of information on the subject. This activity among producers is a counterpart of a similar campaign conducted among consumers for many years to induce them to cook pork thoroughly as a safeguard against trichinosis.

In a recent circular letter, Dr. John R. Mohler, Chief of the Bureau of Animal Industry, directs each inspector in charge of Federal veterinary activities in the principal hog raising states to designate a member of his force to contact farmers and other swine producers individually and in meetings for the purpose of more effective control of trichina infestation in hogs.

The Bureau of Animal Industry's recommendations, as set forth in the official letter to inspectors, are in part as follows:

Inasmuch as investigations conducted in the Bureau have shown that the incidence of trichinae in garbage-fed hogs is much higher than that in hogs not fed on garbage, it is essential to stress that the feeding of raw garbage tends to spread trichinosis among swine. Other sources of trichinosis in swine are:

1. The feeding of offal from slaughterhouses.
2. The feeding of the contents of scrap barrels.
3. The failure to bury, burn, or otherwise dispose of hogs or other animals which die on lots and pastures and which may be eaten by hogs.

BRUCELLOSIS (Brucella Infections)*

Susceptible Species	*Designation of the Disease*	*Causative Agent*	*Methods of Diagnosis*
Cattle	Bang's disease or contagious cattle abortion	Brucella abortus	Rapid or plate agglutination test
Horses	Fistula of the withers and poll evil	Brucella abortus	
Swine	Traum's disease or infectious swine abortion	Brucella suis	Slow or tube agglutination test Complement fixation test
Goats	Bruce's disease	Brucella melitensis	Cultural examination of milk, fetuses, blood, either direct or through guinea pig inoculation
Man	Malta fever, undulant fever, Mediterranean fever	All of the above types but especially melitensis and suis	

* Outline by F. B. Hadley, Madison, Wisc.

New Taxes

Veterinarians employing one or more persons are required to make tax returns under the provisions of Titles VIII and IX of the Social Security Act.

Every person employed by a veterinarian comes under the provisions of Title VIII, which imposes an income tax on the wages of every taxable individual and an excise tax on the pay roll of every employer of one or more. This tax is payable monthly at the office of the Collector of Internal Revenue. The present rate for employer and employee alike is 1% of the taxable wages paid and received.

Under Title IX of the Act, employers of eight or more persons must pay an excise tax on their annual pay roll.

The employer is held responsible for the collection of his employee's tax under Title VIII. All tax payments must be made at the office of the Collector of Internal Revenue in the district in which the employer's place of business is located.

The employers of one or more are also required to file Treasury forms SS-2 and SS-2a. Both are informational forms and must be filed at Collectors' offices not later than next July 31, covering the first six months of the year. After that they are to be filed at regular quarterly intervals. Form SS-2 shows all the taxable wages paid to all employees and SS-2a the taxable wages paid each employee.

Actual money, when paid as wages, is not the sole basis on which the tax is levied. Goods, clothing, lodging, if a part of compensation for services, are wages and a fair and reasonable value must be arrived at and become subject to the tax. Wages paid during sick leave or vacation, or at dismissal are taxable.

Centralizing Veterinary Service

Recently in the British House of Commons the Minister of Agriculture, replying to a question as to plans for the eradication of diseases of animals, stated:

"The Government proposes to initiate a large-scale and more comprehensive campaign for the eradication of animal diseases in Great Britain. Our object is to improve the health of our livestock and increase agricultural productivity by seeking to eliminate what is perhaps the worst of all forms of wastage and economic loss in agriculture. In the first instance, efforts will mainly be directed to eradication of diseases among cattle. The scheme will involve an additional charge on the Exchequer of about £600,000 per annum for the first four years. It will, however, involve centralization of public veterinary services and as against the increased cost to the Exchequer, the expenditure by local authorities will be reduced by about £170,000. Parliamentary authority will be required for these proposals. The Government are anxious, however, to lose no time in developing the existing schemes of control of disease and, accordingly I am arranging at once to amend the Attested Herds Scheme under the Milk Act, 1934, by providing additional assistance in England and Wales, as has already been done in Scotland, to owners of dairy stock who are desirous of eradicating tuberculosis from their herds. This revised scheme will become operative on June 1, 1937.—*Vet. Rec.*, 49:23.

The Hobday Research Endowment Fund

As readers of this magazine know, Sir Frederick Hobday, retires this year from the position of principal and dean of the Royal Veterinary College, London.

As a mark of appreciation of Principal Hobday's services to veterinary science in general and to the Royal Veterinary College in particular, friends in and out of the profession have launched an appeal for funds for the purpose of making a presentation to him on his retirement.

Sir Frederick has expressed the wish that the fund raised shall be devoted to the furtherance of collaboration between the medical and veterinary branches of medicine in their mutual crusade against the diseases of animals which are common to, and communicable between animals and man, and to be in the nature of a research scholarship fund, to be called the Hobday Research Endowment Fund. It is hoped that such research will further the liaison between the two professions and will be of great benefit to the science of medicine in its widest sense.

The proposition is sponsored by a long list of distinguished scientists and others in Great Britain. The committee in charge of raising the funds feels that the idea will be of greatest interest to members of the veterinary medical profession everywhere and it is hoped that among the numerous friends and well-wishers of Professor Hobday, both in England and abroad, a substantial sum, sufficient to carry out the scheme adequately, will be raised.

Communications should be addressed to the Hon. Sec. E. T. Cox, Esq., St. Ermins, Westminster, S. W. 1, London, England.

Radical Operation on a Case of Choke

February 8, 1937, I was called to see a draft filly about eight months old. She showed excessive salivation and some discharge from the nose, which appeared to contain saliva and water. The facial expression was one of anxiety. She would extend, lower the head and cough, take a few steps, lower the head and cough again. Upon palpation, a hard object about three and one-half inches long, and apparently about an inch in diameter could be felt in the middle third of the esophagus. The temperature and respiration were normal; the heart action good.

The owner told me that the colt had not eaten much the previous evening. This meant that the choke was in all probability of 24 hours duration. Upon further questioning the owner stated that the colt had been choked once before, when only three months of age.

Treatment was started by giving one-eighth grain arecoline hydrobromide subcutaneously. A colt stomach tube well oiled was passed through the nose until the foreign body stopped further progress; then a little mineral oil was pumped into the esophagus, and an attempt to dislodge the object or force it down. Meanwhile, an attendant vigorously massaged and worked over the impacted mass with his fingers. Absolutely no headway could be made in this manner.

The tube was then withdrawn and the obstruction was massaged some more and an attempt was made to force it toward the pharynx, but to no avail. Anoher one-eighth grain of arecoline was given and the treatment resumed as before, but without success. The choke was just as tight as ever. Finally, a diagnosis was given of choke due to a corn cob or some such hard substance, and an operation advised.

About half an ounce of chloral hydrate in about two quarts of water was given per rectum after first emptying it of feces. The head was elevated by tying the halter rope to an overhead beam. Three assistants pushed the colt up against a wall. The hair over the object was clipped; the entire operative area shaved; thoroughly washed with soap and water and painted with tincture of iodine. Local skin anesthesia was obtained by the injection of dulcine.

An incision was made directly over the foreign body and parallel to the long axis of the esophagus and extended about an inch beyond the foreign body at each end. The colt showed no sign of pain. She did not even twitch a muscle. The muscle coat of the esophagus was incised with care, exposing the white inner layer; which was then divided with the scalpel at the top of the foreign body clear in to the lumen and a pair of forceps were attached one on each side of the cut inner layer. The incision was carried down to the distal end of the foreign body and two more forceps attached as before. The foreign body was then removed. It proved to be a hard, very tightly packed, wad of coarse feed including soy bean hay.

The mucous membrane was sutured with 20-day gut using a continuous suture, beginning at the top of the incision and continuing down. The muscle layer was sutured in the same manner. Mattress sutures were used to close the incision in the skin.

A piece of bandage soaked in iodine and glycerine (one part iodine to three and one-half parts of glycerine) was inserted full length just beneath the skin and left to protrude at the lower end about one-half inch. Instructions were left to remove the bandage the following morning, and to withhold all feed and water and we would call the following day. The patient was turned loose in a box stall which had a dirt floor and which had been swept out and cleaned to the bare ground.

On our arrival the second day, things were in a terrible mess. There was a large bulge at the site of the operation and a discharge of the most foul odor from the wound. The skin sutures were cut, exposing a mass of filth.

Our patient had become hungry and licked the bare ground and everything in sight; even some dry manure. The pressure had torn loose the gut sutures and we

had a gaping wound almost four inches long extending into the lumen of the esophagus. We could insert three fingers directly into the esophagus. The temperature, however, was normal and our patient was not in the least perturbed by the sorry mess she was in. In fact she muzzled my hand in search of something to eat.

We washed out the filth and dirt the best we could and swabbed the entire wound liberally with the iodine and glycerine mixture. To suture the esophagus again appeared hopeless. We decided to treat it as an open wound and hope for the best.

The wound was swabbed out with the iodine and glycerine four or five times a day and we fed the patient with a stomach tube passed through the nose down the esophagus past the wound and into the stomach. This was one case we did not have to worry where the tube was going, because we could see it plainly in the esophagus, through the gaping operation wound.

We fed the colt with the tube every day for ten days, then every other day until March 10th. By this time the wound was almost closed and the patient was allowed to eat its food from a bucket. The mixture fed the colt through the tube consisted of two quarts of whole milk, one pound of corn meal and one-half pound of sugar. This was pumped into the stomach through a stomach tube passed through the nose.

At no time did our patient show any elevation of temperature or any discomfiture except at feeding time. She lost a little weight, but not so much but that her general condition could be called fair. At the present time the wound is entirely healed and the scar is imperceptible except on close observation. The owner was advised to feed chopped hay and grain slightly moistened for several months.

Comment: (1) The colt should have been fed with the stomach tube immediately after the operation and for four or five days thereafter. This would have allayed the hunger and avoided disastrous results, besides keeping up the general condition. (2) The colt should have been cross-tied to prevent eating, until the sutures were ready to be removed.

I shall appreciate any comments, suggestions or criticisms that any colleague may make.

JOHN MICUDA.

Rockville, Md.

Scientific Terms Used in Animal Breeding and Hormone Studies

To help animal breeders in learning the meaning of the words more commonly used in these fields of study, this list of definitions has been prepared.

General Terms

Sexual season. The particular time or times of the year at which the sexual organs exhibit a special activity. Some animals (vixen) have only one season per year; others (bitch) have two; others (cow) have a practically continuous season.

Anestrum. Season of absence of sexual activity.

Estrous cycle. The chain of events having to do with reproduction and occurring in the non-pregnant female from the beginning of one heat period to the beginning of the next.

Postestrum. Period immediately following *heat* or *estrus.*

Diestrum. Period between postestrum and proestrum.

Proestrum. Period before heat during which the follicles are developing in the ovary and the animal is preparing to ovulate, but during which she will not take the male. Estrus follows immediately after completion of the proestrous period.

Ovarian or graafian follicle. The fluid-filled sac in the ovary. To its lining membrane is attached the ovum. The contents of the sac are termed *follicular fluid.*

Spontaneous ovulation. The rupture of the follicle and escape of the ovum from the ovary without the stimulus of copulation.

Induced ovulation. Some species ovulate only if copulation occurs. In them ovulation is said to be induced (rabbit).

Corpus luteum or "yellow body." A transitory endocrine gland formed within a ruptured ovarian follicle by an ingrowth of its lining membranes. The interval of its existence depends upon fertilization of the ovum.

Pseudopregnancy. A period following heat during which the female may show symptoms of pregnancy, but is carrying no young. The changes in the genital tract during the early part of pseudopregnancy are identical with those of pregnancy, but later the genital tract goes into the anestrous condition. It usually lasts a shorter time than pregnancy, but may be equally as long.

Corpus luteum atreticum. An ovarian follicle

that has been converted into a corpus luteum without release of the ovum.

Gonad. A general term applied to either the ovary or the testicle.

Lactation. The period during which milk is being secreted.

Sex Hormones

Sex hormones. Chemical substances secreted into the blood by the endocrine glands, or glands of internal secretion. They are carried in the circulation to the genital organs, where they aid in controlling the process of reproduction.

Theelin. A female sex hormone produced by the follicle of the ovary but is secured for therapeutic use from the urine. It stimulates heat and induces growth of the uterine glands as well as of the milk ducts in the udder. It is also secreted by the fetal membranes. The terms estrin, folliculin and estrogenic hormone are also used to designate this hormone.

Progestin or *corporin.* A hormone produced by the corpus luteum which acts either with or following the action of theelin. It stimulates the uterine glands to secrete "uterine milk," and the endometrium to produce a maternal placenta. It also quiets uterine activity and is instrumental in the development of secretory tissue in the udder.

Relaxin. This hormone is also a product of the corpus luteum. Its purpose is to relax the pelvic ligaments at time of parturition. It acts in combination with theelin.

Testosterone. The male or testicular hormone, which is responsible for masculine behavior and for the development of the secondary male sex glands. It stimulates the epididymis to secrete a substance to keep alive the stored sperm cells; the seminal vesicles, prostate and bulbo-urethral glands to produce their secretions; and the scrotum to serve as a heat regulator for the testicles.

Prolactin or *galactin.* A hormone of the anterior lobe of the pituitary gland which starts the mammae to lactate.

Gonadotropic hormone. An anterior pituitary hormone which stimulates the gonads to secrete their hormones. It is also responsible for maturation of follicles, ovulation, and corpus luteum formation in the female, and for spermatozoa formation in the male. This hormone may be a mixture of both follicle-stimulating and luteinizing substances.

Growth, ketogenic, thyreotropic, parathyreotropic, adrenotropic, diabetogenic, pancreaticotropic hormones. All these hormones and some others not well understood are also produced by the anterior pituitary.

Oxytocin or *pitocin.* One of two hormones of the posterior pituitary. It acts only on the involuntary muscle of the uterus, causing it to contract, so is useful in dystocia.

Pitressin. The other hormone of the posterior pituitary which acts on smooth muscle especially that within walls of the blood vessels, thus increasing blood pressure.

Other Hormones

Thyroxin. The hormone produced by the thyroid gland. It contains iodine and influences energy metabolism, growth, and nutrition, as well as the functional activity of the sex organs.

Dog with artificial leg. See description by Dr. James R. Ketchersid on the next page

Parathormone. A secretion of the parathyroids which regulates calcium metabolism.

Adrenalin or *epinephrin.* A hormone of the adrenal medulla which acts through the sympathetic nervous system, causing contraction of the muscles in the walls of the small blood vessels and resulting in the blood flowing faster, thus relieving fatigue. The extract of the medullary portion of the gland has proved effective in anaphylactic shock.

Cortin. A hormone of the adrenal cortex which is said to influence sodium and water metabolism.

Insulin. A secretion of the pancreas that regulates the amount of blood sugar. It has wonderful antidiabetic properties and is the best known of the hormones.

Commercial Hormone Products

Gonadin serum. Trade-name of pregnant mare serum which contains gonadotropic hormone.

Prephysin. Another gonadotropic product prepared by extracting pituitary glands and prescribed for ovarian dysfunction.

A. P. L. Hormone. An extract of the anterior lobe of the pituitary. It may have some value in the treatment of sterility attributable to hypofunction of the sexual organs.

Oestrual hormone solution. A commercial product prescribed for animals affected with functional sterility, senile atrophy, and infantalism. Probably contains a small amount of theelin.

Corpus luteum extract. Recommended for the treatment of habitual abortion not attributable to infection with *Br. abortus,* to relax the pelvic ligaments in difficult labor, and to suppress estrum. Probably contains small amounts of progestin and relaxin.—Departments of Veterinary Science and Genetics, University of Wisconsin.

Artificial Limbs for Dogs

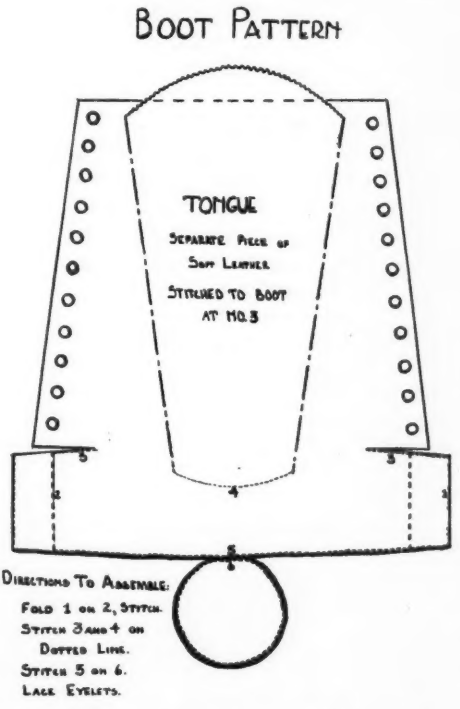
Although veterinary literature contains a good many reports of the use of modified artificial limbs in animals following amputations, especially in cows, the practice cannot be said to be in any sense routine. In the case of amputation in the dog, treatment seldom goes further than healing of the wounds. The human physician, on the contrary, advises the use of artificial limbs in most cases of amputation. Is it not logical to accord the same humane consideration to a pet that has been deprived of part of a limb?

How practical is a mechanical support in actual use? There has been limited work on this subject reported in veterinary literature by practitioners; however, such reports as there are, indicate that modified artificial limbs have value in certain types of cases. The following experience supports this view.

July 11, 1936, "Mickey," a male Boston terrier, was presented at the Bower Animal Clinic, Topeka, Kansas, for examination and treatment. Mickey's right fore foot had been caught between the drive chain and sprocket wheel of a bicycle. The entire foot, including the lower two-thirds of the metacarpal region, was badly mangled. The bones were exposed and the joints disarticulated. Amputation was advised. The owner authorized the operation, but he was reluctant to permit amputation just above the scapulo-humeral articulation. He was anxious to save as much of the limb as possible. After consultation, the amputation was made just above the metacarpal region. The wound of the extremity healed. The doctor then advised that an artificial aid be provided to give the dog added support and thus by use prevent atrophy in the shoulder region and deformity of the body contour.

A pattern (see illustration) for the mechanical support designed for this particular case, was submitted to a shoemaker, who constructed a boot. The entire length of the support was measured so as to extend from a point two inches below the humero-radial articulation to the ground. The upper part was made of a soft buckskin, which in turn, was sewed to a heavy, tough leather, forming the lower portion, or that part which was to extend beyond the end of the stump. This lower part was made by building-up discs of heavy leather, as in the construction of the heal of a shoe, until the desired thickness was obtained. The upper, soft leather was slit longitudinally at the front, and eyelets were evenly spaced on each margin for lacing. Cotton was placed inside the boot at the point of contact with the stub.

The artificial support was installed, much to the disgust of the patient, 17 days after



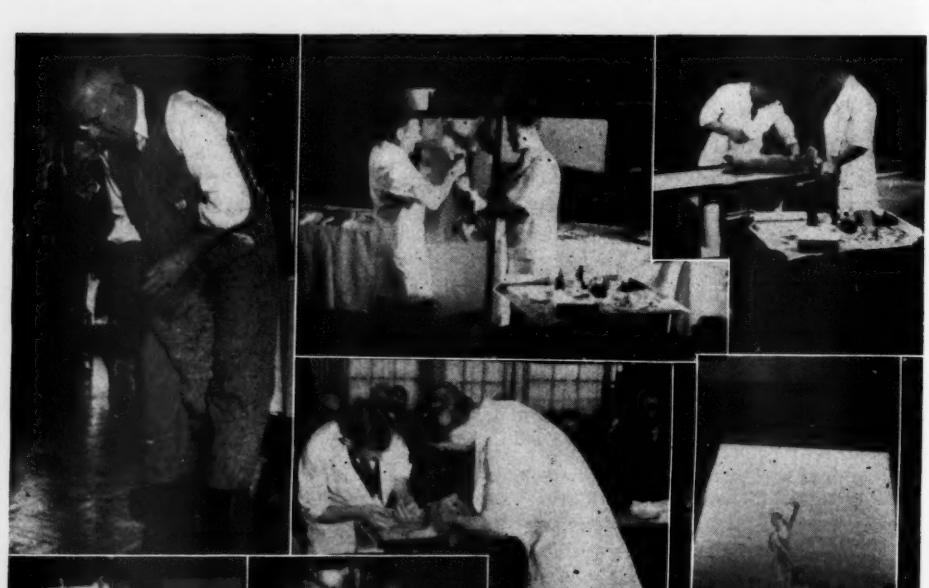
amputation. During the first few days "Mickey" wore the support only a few hours daily. Later the time of wearing the boot was gradually increased, until he learned to place his weight upon it. Soon afterward he became unconscious of the boot, wore it continually and was able to run and play comfortably. There was no atrophy of the shoulder muscles that could be seen.

Artificial support may be substituted for the posterior limbs by the same method provided the amputation be at any point below the hock. This is due, of course, to the change in direction of motion at that join. Often, from accident or paralysis, there is need for support of both hind legs. An efficient support for this purpose, may be made by constructing a light frame of aluminum wire. The frame should be constructed in one piece and have an extended part reach to the ground on either side connected by two cross bars to support the ventral surface of the body. These cross bars should be curved and padded in a crutch-like manner. The lower part of each extension should be fitted with a small wheel. A sturdy wheel from a child's small wagon or a roller skate wheel may be used for this purpose. With this type of support, a crippled dog can get about quite well after he learns to use it.

-- JAMES R. KETCHERSID, K. S. C., '37.
Manhattan, Kans.

Lymphangitis of the Horse

The unqualified word "lymphangitis" used in equine medicine refers to a well delimited affection striking one of the hind legs with a sudden inflammatory trouble beginning at the medial face of the thigh. It is common in draft horses, rare in the lighter breeds. Although a common affection of the draft breeds, and a grave one, having a uniform clinical expression and course, it is nevertheless an ailment that



Clinic scenes at the annual meeting of the Indiana Veterinary Medical Association, Jan. 20-21, 1937. Top: left, Dr. Engard, Marysville, Ohio, passing the stomach tube on a sheep; center, Dr. A. R. Theobald, Cincinnati, assisted by his technician, Mr. Ader, performing an oothecectomy; right, canine clinic; bottom, views of the small animal clinic, Dr. A. R. Theobald, clinician.

is strangely avoided by many authors purporting to cover the entire catalogue of animal diseases. One might search his library in vain for information on "lymphangitis of the horse," notwithstanding that few diseases of the work horse have a greater potentiality for ruinous harm. An attack disables the victim for a week or more and several of them blemish the leg with a cutaneous fibrosis varying from a slight chronic tumefaction of the fetlock to a heavy, unwieldy elephantiasis voluminous as a fire plug.

In Belgium, home of good draft breeds, the disease is called "essential lymphangitis." English authors have called it "Monday morning disease," "weed," or just "lymphangitis." Yet, no one has ever proved that it is a lymphangitis. Perhaps it is; perhaps it isn't. Anyhow, the experimental blocking of lymphatic vessels and veins, partial or complete, does not produce a picture at all comparable to that of lymphangitis. Proof of this is the experimental work of Cohnheim (1850), Josué and Rogers (1895), Gabrielle (1926) and of Reichert (1930) who, in practicing ligation with the view of producing the syndrome, produced only a passing edema entirely lacking the nature of the swollen leg of the lymphangitis case.

Etiologic Theories.—The disease baffled the ancient hippiaters. Solleysel (1670) believed the trouble was caused by the bite of rodents. Garsault (1739) entertained the same idea. LaFosse (1761) thought lymphangitis was a type of anthrax. Bouley (1836) insisted that the trouble was in the lymphatic vessels. Mottet (1862) wrote that the disease was due to injury to the hock with phlebitis of the saphenous vein as its flare up. With the coming of pathogenic bacteriology, the disease was dismissed as an infection entering through non-apparent abrasions but inasmuch as apparent portals of entrance did not cause the disease, that theory was not taken too seriously. The German and English authors in general have placed lymphangitis among the reactions to digestive disorder. Zundel remarked that the disease was rarely seen in horses fed regularly with oats. Koerber wrote of musty oats. Exposure to cold during spring and fall months, perspiring under a heavy winter coat, sudden changes of feed and of temperature are listed in the literature as other causes to incriminate.

More recent theories are those of Van Wallendael (1936) who pronounces lymphangitis an anaphylactoid phenomenon comparable to urticaria, eczema, asthma. Jassens (1937) sets all these theories aside and attempts to prove that rupture of muscles fibers at the level of the thigh from slipping as the one and only cause. We bring down these diversified ideas to the present day to show that the controversy over lymphangitis of the horse is still extant.

One recalls the high incidence of the disease in certain stables and its entire absence in others apparently managed in the same fashion. Crowe mentions the high percentage of lymphangitis cases in one stable of the American Railway Express and its comparative infrequency in other stables engaged in practically the same type of cartage. Jassens (*loc.cit.*) records a similar observation in Belgium where, in one stable, he lowered the incidence of the trouble by changing slanted stall floors to level ones. This he mentions in support of his traumatic theory. To him the higher incidence of the disease in farm horses corresponds to the seasons of hard work (spring and fall). In the urban draft horse the disease is not seasonal. It occurs all the year around.

Course and Symptoms.—The symptoms are strikingly uniform. At the onset a stroke of the hand from the inguinal region down over the medial face of the limb causes intense pain. Walking is painful. The temperature is around 103° to 104° F.; the appetite suspended, more or less; the bowels constipated. Mucous membranes are engorged and perhaps slightly icteric. This chain of signs is followed on the second day with swelling of the lower part of the leg, recession of the fever, and attenuation of the pain. The swelling increases for three or more days, sometimes a week, and then gradually recedes. Com-

plete recovery comes in from one to two weeks at the end of which time everything is normal except possibly a tendency to stock somewhat at the fetlock over night after the day's work. Whatever the causative factor is, it remains, for, once a horse has an attack of lymphangitis it is apt, sooner or later, to have another; to end up in a permanent enlargement of the skin of the leg below the hock. If one knew the nature of the agent stimulating the formation of the new tissue one would know the nature of the disease itself. To pass off the building up of an elephantiasis as the mere action of edema is not reasonable. Other edemas do not cause elephantiasis. That strange neoformation of a horse's hind leg is chargeable only to lymphangitis. There is a great difference between the physiognomy and course of the enlarged fetlock and shin supervening known injuries and the elephant leg supervening attacks of lymphangitis. The one remains stationary, the other is progressive, in obedience to attacks of lymphangitis which, one should remark in passing, becomes milder and milder. That is to say, the toxic agent no longer acts severely upon the inner face of the thigh but seems to confine its action to the enlargement.

Treatment. — The standard treatment has always begun with a purgative dose of aloes and hot fomentation of the leg. Diuretics of which calcium chloride is now regarded as the best, complete the internal medication. A restricted, laxative ration and exercise when the pain permits are essential.

The prevention of recurrent attacks is, however, more important than the medicinal treatment of the given case. In a communication to the Société Royale de Médecine Vétérinaire of Brabant, January, 1937, Van Wallendael points out the possible relation of lymphangitis to hypocalcemia of parathyroid origin and mentions execllent results obtained in dispersing the edema by the administration of calcium gluconate in 60-gram (2 ounce) doses. Because of the fact that the sodium ion is edematogenic and the calcium ion is dehydrating, it is not far-fetched to think of calcium deficiency or mal-adjustment of the sodium-calcium ratio as one of the factors in the causation of this disease.

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L. A. MERILLAT.
Chicago, Ill.

Indiana Veterinarians

On the following page are halftones of some of the members and visitors in attendance at the annual meeting of the Indiana Veterinary Medical Association, Jan. 19-21, 1937. Their names and addresses, right to left, follow:

Top row: B. V. Allen, Fort Wayne; N. W. Elsbury, Greenfield; G. W. Andree, Rensselaer; W. K. York, Fort Dodge Laboratories, Indianapolis; H. L. McCormick, Pendleton; G. F. Eichhorn, Decatur; F. E. Moore, Alexandria, and Herman Busman, Indianapolis.

Second row: F. C. Tucker, Claypool; W. B. Craig, Indianapolis; C. C. Donnelson, Indianapolis; T. A. Sigler, Greencastle; J. L. Kixmiller, Indianapolis; C. A. Fast, Van Wert, Ohio; J. A. Schwartz, Danville, and Roscoe Hyde, Hartford.

Third row: C. J. Hufty, Burlington; G. D. Haimbaugh, Rochester; D. D. Bradbury, Fairbanks; F. M. Tibbett, Kingman; F. W. Bratten, McCordsville; S. M. Friedley, Muncie; R. F. Dean, North Salem, and R. E. Wood, Rockville.

Fourth row: C. P. Wilson, Lawrenceville; H. M. Bratt, Terre Haute; D. W. Gerber, Clay City; G. E. Botkins, Marion; S. E. Bowman, Odon; Edgar D. Wright, Bluffton; P. O. Bonham, Mooresville, and C. O. Petry, Ossion.

Fifth row: Michael J. McGinty, Indianapolis; J. M. Atteberry, Albion, Ill.; G. E. Keith, Plymouth; V. S. Hadley, Mooresville; J. V. Bayles, Pennville; E. D. Anderson (president, Indiana Veterinary Medical Association), Mentone; J. A. Makowsky, Sellersburg, and G. M. Wagaman, Kokomo.

Sixth row: A. L. Johnson, New Harmony; W. M. Seeger, Thorntown; C. C. Hastings, Williamsville, Ill.; F. H. Brown, Indianapolis; O. W. Hiner, Butler; R. J. Hoskins, Indianapolis; L. C. Finley, Lapel, and H. Hostetter, Albion.

Seventh row: Mrs. G. D. Haimbaugh, Rochester; Mrs. W. B. Craig, Mrs. J. S. McLaughlin and Mrs. J. C. Schoenlaub, Indianapolis.

Eighth row: (1) Indiana veterinarians watching Dr. P. T. Engard, Marysville, Ohio, demonstrate the handling and medication of sheep: (2) Dr. A. R. Theobald, Cincinnati, Ohio, and assistant conducting the small animal clinic at the Indiana meeting.

Vitamin Deficiency Diseases in Poultry*

By B. R. BURMESTER, Urbana, Illinois,
Assistant in Animal Pathology,
University of Illinois

Poultry was raised successfully for centures before the discovery of vitamins. Not until man had brought about a radical change in the natural habitat and productivity of the chicken was any difficulty encountered. We have learned from experience that the more control we have had over the diet the more we must know of the nutritional requirements of the chicken. This is not only true for the chicken but for any animal.

Certain poultry production practices have and are undergoing a gradual change. The intensification has been increased tremendously. It has changed from the small unit with an unlimited grass range, to a large unit and a restricted range, then to the still larger unit with no range, and finally to the multiple unit, hen battery cages where absolutely all of the nutritive requirements of the bird must be supplied by the ration that is given her. Here a consideration of the vitamin requirements becomes of paramount importance.

Since it will be impossible to cover the whole vitamin field at this time, this discussion will be limited to brief summaries and to the more recent developments in this field.

The Anti-Hemorrhagic Vitamin or Vitamin K

Several investigators have described a hemorrhagic condition in young chicks fed a diet deficient in this vitamin. The hemorrhages may occur in any part of the body, but principally in the muscle, under the skin, and from feather follicles. Growth is normal until an excessive loss of blood has resulted in a severe anemia. This condition can be completely prevented or cured by the addition of micro amounts of a highly purified unsaponifiable fraction of a hexane extract of alfalfa or other green plants. The factor is stable to heat and light. It is also synthesized by certain putrifactive bacteria.

Apparently the main physiological change which takes place when the chick becomes hemorrhagic is an increase in the clotting time of the blood. In some cases the blood has entirely lost its ability to clot, in others the blood will require hours instead of the normal of 2-3 minutes for coagulation. If blood serum or aqueous tissue extracts of a normal bird is added in small amounts to the blood from a hemorrhagic chick coagulation will take place in normal time. By the use of salt and isoelectric precipitation methods a protein fraction has been separated which is highly potent in reducing the clotting time of hemorrhagic chick blood to normal This protein fraction reacts much like a globulin.

It is interesting to note that the substance found in blood necessary for normal coagulation and absent in birds on a vitamin K deficient diet is so different from vitamin K itself. The former is water soluble and a protein whereas the latter is fat soluble and unsaponifiable. Apparently the formation of the former is dependent in some way on the presence of the latter.

The Anti-Gizzard Erosion Factor

Erosions in the gizzard lining of chicks occurred quite generally when fed diets conductive to the formation of the hemorrhagic condition. For some time it was thought that the gizzard erosions were a part of the hemorrhagic syndrome; however, since then it has been demonstrated that the anti-hemorrhagic factor is different and entirely separate from the anti-gizzard erosion factor. The latter factor is fat soluble and found in the saponifiable fraction and is found in varying amounts in green plants and cereals.

Although relatively small amounts of alfalfa leaf meal will prevent the occurrence of hemorrhages in chicks much larger amounts are necessary for the prevention of gizzard erosions. Gizzard erosons are very often found in chicks on a common practical chick ration.

* Presented at the Seventeenth Illinois Veterinary Conference, University of Illinois, Nov. 12-14, 1936.

The Vitamin B Complex

Vitamin B was one of the first vitamins to be discovered, yet at the present time our knowledge of the nature and identity of the components which were originally included in this vitamin is far from adequate. Ten years ago vitamin B was differentiated into two separate components, (1) the antineuritic factor, now called vitamin B or B_1, and (2) the growth promoting antipellagra factor, now named vitamin G or B_2. A short time ago vitamin G was split up into at least three components. Other factors have also been separated which in all probability were included in the original vitamin B.

Vitamin B or B_1

The importance of vitamin B in the poultry ration has been long established. Baby chicks on a ration deficient in this vitamin fail to grow normally and when seven to 10 days old develop the symptoms of polyneuritis, which is characterized by progressive paralysis of the leg and wing muscles, loss of equilibrium, head retraction and "cartwheel turning." This condition may be cured or prevented by the inclusion of 4%, air-dried yeast in the ration. This vitamin is also present in significant amounts in egg yolk, liver, cereals and green feeds. The normal cereal rations fed to poultry will as a rule contain an adequate supply for the bird's requirements.

Vitamin G and Associated Factors

By the use of absorption on fullers earth and heat treatment methods vitamin G has been broken up into three components. The name vitamin G has been reserved for the component which is the chemical compound called flavin. It is a yellow green pigment found rather widely distributed. Potent sources are whey and egg white.

A. A deficiency of flavin in the diet of the rat results in:

1. A dermatitis—loss of hair, yellow and reddish scales on skin, eyelids red and swollen;
2. Distended abdomen and diarrhea;
3. Impaired growth.

B. A deficiency of flavin in the diet of the chick results in:

1. An absence of dermatitis;
2. Good appetite but slow growth, emaciation, diarrhea and high mortality;
3. No impairment of feather growth.

C. A deficiency of flavin in the diet of the turkey poult results in:

1. A dermatitis—encrusted mouth, sticky eyelids with no discharge, ragged feathers and a sore caked vent;
2. Impaired growth and usually death at 21 days.

A marked response is obtained in all animals when micro amounts of crystalline flavin is added to the diet. The animals become normal in all respects.

A deficiency of factor No. 1 which is probably identical with the factor known by other investigators as vitamin B_6, in the diet of the rat will result in a dermatitis which is quite different from the flavin deficient dermatitis. It is not known as yet what part, if any, this factor plays in the nutrition of the chick.

An inadequate amount of factor No. 2 which is also known as the "filtrate factor" in the diet results in the following phenomena:

A. In the rat, (1) swollen eyelids and (2) impaired growth.

B. In the chick, (1) dermatitis—encrusted mouth, swollen and sticky eyelids with no discharge, ragged feathers, scales on feet thicken and cracks appear and (2) slow growth.

C. In the turkey poult, (1) absence of dermatitis and (2) high mortality and slow growth.

When this vitamin is added to the diet in a highly purified form normal growth is regained and the animals become healthy again.

Contrary to expectations the turkey poult reacts to the deficiency of these factors, more like the rat than the chick. Dermatitis is produced in the rat and turkey and not in the chick on a flavin deficient diet, whereas the absence of the filtrate factor" results in a dermatitis in the chick and not in the turkey or rat.

The vitamin G requirements of poultry is relatively high especially for good hatchability and high egg production. Several

investigators have pointed out that some of the common poultry rations may be deficient in vitamin G.

Alfalfa and milk products are good sources of vitamin G. Yeast, cereals and their by-products and alfalfa meal are good sources of the "filtrate factor."

Other Factors

Several new factors have been described which are necessary for the normal growth and health of poultry. These findings are still in the early experimental stage and require confirmation before acceptance.

Vitamin B_4.—A water soluble vitamin which is known as B_4 is required by the chick and pigeon for normal growth and the prevention of a characteristic paralysis accompanied by degeneration of the cerebellum. This factor is found in bluegrass, alfalfa, peanuts and liver.

Micromelia.—A large percentage of embryos from hens on certain diets adequate in all known vitamins will develop relatively short bones, especially the long bones of the legs and wings. In extreme cases the periosteal bone is entirely replaced by a matrix containing degenerated cartilage cells. Water extracts of liver, grass, whey and wheat germ will prevent this condition.

Nutritional Encephalomalacia.—A type of paralysis very much like polyneuritis, but yet quite distinct from the vitamin B deficiency disease has been accurately described. A post-mortem examination reveals discolored spots on the surface of the cerebellum and edema of the brain. The nonsaponifiable fraction of soybean oil is a potent source of the preventive factor. It is easily oxidized but is heat stable.

Vitamin A

The importance of vitamin A in the poultry ration has long been known. Since the literature on this vitamin is extensive very little detail will be given here.

The symptoms of nutritional roup—the disease resulting from vitamin A deficiency—are easily recognized in the advanced stages. The pustule like lesions of the mouth, pharynx and esophagus and the accumulation of urates in the kidneys and surfaces of other organs are all easy to identify. The difficulty arises in the correct diagnosis of the disease in its early stages or where the deficiency is only partial. In this case none of the above symptoms appears and only those which are almost indistinguishable from a common cold can be recognized. Even a partial deficiency will produce certain degenerative changes in the epithelial cells which facilitates the entry of bacteria, hence increasing the susceptibility of the bird to infectious diseases. This does not mean that by the addition of more vitamin A to the hen's diet her resistance to disease is increased. It is true only when a deficiency originally exists.

The vitamin A requirement of high-producing hens is much higher than that of low-producing hens and growing stock. This is due to a deposition of a large amount of vitamin A in the egg yolk. Although the vitamin A of the yolk can be increased by feeding larger amounts of this vitamin, the bird will deprive her own tissues of this essential food factor before allowing the vitamin A content of the yolk to decrease below a certain minimum.

Vitamin D

A deficiency of vitamin D in the diet of a growing bird results in a leg weakness which has more or less generally been assumed as being analogous to mammalian rickets. More recently several investigators have criticized this assumption and believe the leg weakness is due to osteoporosis.

Since the embryo absorbs only small amounts of calcium from the egg it is greatly lacking in this element and its bones are in a markedly osteoporotic condition. Inasmuch as the natural foodstuffs contain a significant amount of phosphorus, it is unlikely that the chick will suffer from a phosphorus deficiency, but almost certain that the amount of calcium will be inadequate. This latter deficiency exaggerates the osteoporotic condition of the newly hatched chick. In the usual amended diet, large quantities of calcium, generally as calcium carbonate, are added, but owing to the alkalosis induced the calcium is not absorbed and the condition of osteoporosis persists. If calcium is added as a neutral or acid

salt, ravoring its absorption in the upper intestinal tract, it will combine with phosphorus in the blood stream and the two essential elements will then be precipitated in the lower gut, resulting in a phosphorus deficiency. This condition leads to the true form of rickets. It is doubtful whether the exact amount and chemical combination of the calcium given would avoid these two conditions without the addition of vitamin D.

It has been suggested that vitamin D performs its favorable action by setting free nascent phosphoric acid from the phospholipoids of the tissues. This results in a more acid condition of the body, which prevents the precipitation of calcium and phosphorus and favors their circulation as the chloride. Vitamin D, by these fundamental actions, prevents, on the one hand, the occurrence of osteoporosis due to a deficiency of calcium available to the osteoblasts, and on the other, rickets due to a phosphorus deficiency.

The vitamin D requirements vary greatly with the diet. In general, the farther the calcium and phosphorus ratios and amounts are off from the optimum figure the higher are the vitamin D requirements.

For some time it was thought that calciferol, which is formed by irradiation of ergosterol, was the one and only vitamin D. However, more recently numerous experiments have demonstrated that amounts of irradiated ergosterol and cod liver oil, which have been found of equal antirachitic potency in the rat, have different values for chickens. Other sources of vitamin D have been tested and it was found that in general all plant sources of provitamin D, ergosterol, were much less effective in the chick on a rat unit basis than animal sources of provitamin D.

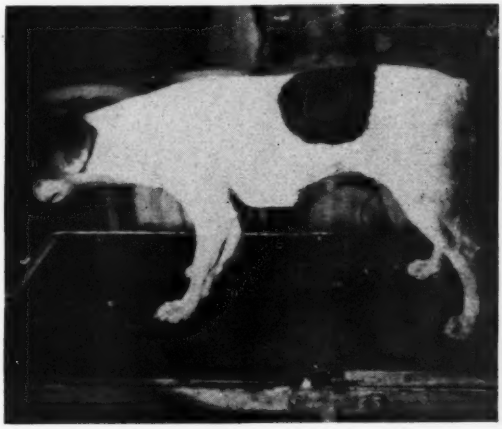
Animal sterols are of the cholesterol type. Recently it was demonstrated that irradiated cholesterol has the same rat unit potency as cod liver oil in the chick. This suggests that cholesterol is the provitamin D of animal origin and ergosterol is the provitamin D of plant origin. Apparently the chicken can utilize the animal source more efficiently than the plant source when the rat is used as the assay animal.

Chickens require 10 times as many rat units of irradiated ergosterol as of cod liver oil. Turkeys and pheasants require two to three times the amount adequate for chickens.

Tetanus Then Distemper

The animal shown in the illustration was suffering from an acute attack of tetanus at the time the illustration was taken.

The source of the infection is not positively known, but infection through a surgical wound is suspected since she was spayed on the same day that I treated a case of tetanus in a horse. Although strict



aseptic precautions were observed in the operation, the fact that tetanus developed 18 days after she was spayed causes me to suspect surgical infection.

The treatment consisted of the administration of 10,000 units of antitoxin, the daily application of all the heat the patient could stand from an infra-red lamp and sedatives as required. The relaxing effect of the heat was marked at each application and very much enjoyed by the animal.

Recovery from the attack of tetanus was practically complete in two weeks, but before this time the dog developed distemper with complications from which recovery was slow, but eventually occurred.

C. Herman Beckman.

St. Louis, Mo.

Drugs Used in Veterinary Medicine

III. Arsenic

By VICTOR LEWITUS, New York

Instructor in Materia Medica, Columbia University College of Pharmacy, Associate Professor in Materia Medica, First Institute of Podiatry

Historical Sketch.—Arsenic is perhaps one of the most popular elements known. Its early history is connected with poison lore more than any other substance for notoriously it was used for criminal purposes, long before science discovered its peculiar virtues. It seems to have had a peculiar fascination for the professional poisoner of bygone days. Connected with it through all the centuries, is a long thread of romance and mystery which challenges even the strongest imagination!! Its notoriety was due, at least in part, to the fact that the poisoner of early times considered it to be a "traceless" toxin. At that time no positive means of detection was known. It was during the reign of Queen Victoria that the potent substance enjoyed its "heyday," for during that period, some of the most famed royalty were waylaid by this most toxic substance. Many ambitions were abruptly ended by this means. It was not long afterward that the detection of the active material by the chemist put a stop to most of this homicidal use, but it still on occasion is quaffed with coffee.

In the days of Dioscorides, realgar (red arsenic sulphide) was recommended as a depilatory and caustic, and orpiment (the yellow arsenic sulphide) was similarly employed. The latter was used as a dressing for ulcerated surfaces and as a parasiticide also. The ancient Chinese are known to have used arsenic in the treatment of intermittent fever, and to this day Turkish women employ it as an efficient depilatory to comply with the precepts of Mohammed.

Ordinarily the term "arsenic" does not apply to the metalloid element, which is normally of a dark steel-gray color, but, as a rule, to arsenic trioxide (As_2O_3) otherwise known as "white arsenic." Since this compound is odorless, as well as tasteless in small quantities, one can readily perceive why habitual poisoners of former days held it in such favor.

The original use of arsenic in medicine was mainly in the form of salves or pastes for external application, but because of its painful and irritating action on superficial lesions, its use in human medicine for such purposes has gradually declined in this country; being almost obsolete now. Occasionally one still hears of some charlatan who hawks his arsenic paste in front of gullible crowds as a "cancer cure." It is interesting in this connection that amongst dermatologists arsenic is considered to be a possible *cause* of cancer instead of a cure! There appears to be some relationship between carcinomatous lesions and its internal administration over long periods.

The disadvantages of the inorganic arsenicals induced scientists to seek improved compounds. It was not long before they learned that arsenic is a specific for syphilis, and by complex organic combinations advancement came. It is perhaps to Ehrlich—the discoverer of salvarsan or 606 that arsenic today enjoys such widespread popularity, even though since his day marked improvements have been made. It may here be pointed out that modern arsenical therapy was stimulated considerably by Thomas Fowler's published treatise on "the cure of agues" by arsenic in 1786. This was a substitute for quack remedies.

Arsenical Dips

The best dipping materials on the market to eradicate biting and sucking lice occurring on horses and cattle, as well as hogs and goats, contain arsenic as the chief active ingredient. Its use on sheep is not recommended. Though it has been formerly employed in the treatment of mange, the dip has been found ineffective in these cases.

There are various formulae put up by various concerns or recommended by the government, but the most practical of those that may be made on the premises consists of the "self-boiled" type which calls for

two stock solutions to be mixed only in the diluted dipping bath. One of these is the so-called "arsenic stock" and the other the "tar stock."

The arsenical solution is prepared by adding to four pounds of caustic soda, in an iron pail or barrel, one gallon of cold water stirring it with a wooden stick until solution occurs. Ten pounds of white arsenic should be slowly added to this solution of sodium hydroxide—a little at a time—stirring constantly to avoid any boiling. In case boiling begins, stop the addition of arsenic until it subsides. The idea is to add the arsenic at such a rate that the solution will be very hot, but not at the boiling point. If this step has been properly carried out, and the original materials were pure, there will be no residue and the resulting liquid is permanently clear. Sometimes, sodium arsenite may crystallize out and the addition of about another gallon of water becomes necessary to keep it in solution. Heating gently during this last addition also helps. Once the solution is clear, add more water up to about four gallons and then add sodium carbonate (sal-soda) ten pounds. Stir until the soda is all dissolved. The dangers from splashing during the operation of mixing and boiling should be pointed out to the worker preparing this solution. Furthermore, inhalation of the vapors should be avoided and proper ventilation maintained during the process. Once the solution so made has cooled, add enough water to bring the whole volume to five gallons. This latter solution may be stored by drawing off into gallon jugs after it is cold. The bottles must be properly labeled "arsenic stock" to avoid accidental poisoning.

The "tar stock" is prepared as follows. Into a metal pail place on quart of water, and in this dissolve ¾ of a pound of caustic soda. Now add one gallon of pine tar stirring constantly until a uniformly thick molasses-like fluid results. Test it from time to time by letting a small sample drop into a jar full of water to see if it mixes readily. In case the tar settles out, add a little more caustic soda until a uniform or homogeneous result is obtained. A low grade soda or acid tar may call for the last-mentioned addition of soda. The tar stock should then be stored away in a covered metal container until needed.

For making 125 gallons of the dipping bath, one gallon of this self-boiled mixture (arsenic stock) is used together with one gallon of the tar stock. This gives an absolute arsenical strength of .19% when it is fresh and oxidative processes have not vitiated its power. (For additional information regarding such arsenical dips, see U. S. D. A. Farmers' Bulletin 1057; pages 18-27.)

With arsenical dips the ever-present dangers must always be kept in mind. In handling the arsenical powder or in the process of boiling, inhaling the vapors or allowing spattering on the face, hands or clothing must be avoided. Stock solutions, since they contain the dissolved concentrates, are particularly dangerous once they are finished; animals must be prevented access to them and the handler must keep it off the skin surfaces. Spilling on the ground may cause poisoning, since animals seeking salt may lick the earth saturated with arsenic. The diluted bath, though less dangerous still entails a risk especially if the freshly-dipped animals are not allowed to drain off in a special enclosure from which they must be subsequently excluded. There is a further danger to very thirsty animals from the liability of drinking some of it during the dipping. Drains leading from the dipping vats must not lead to nearby wells, streams or springs which are apt to become contaminated.

Other than for dipping, arsenic has little place in the treatment of external surfaces. It was at one time employed to stimulate the granulation of wounds, ulcers, and other such lesions but, due to the pain it induces, its application for such purposes has become almost obsolete.

Internal Action

The numerous forms of arsenic for internal use fall into two classes, the trivalent and the pentavalent; the former inducing the typical action of the group. It is thought by most authorities that the pentavalent form acts like the trivalent only after it is reduced in the tissues to the lat-

ter form. The change from penta- to trivalency occurs at various rates depending on the form of the compound involved, the rate of dosage and the condition and species of animal.

When given to animals, arsenic at first produces a slight irritation of the gastrointestinal tract; at times producing nausea, diarrhea and sometimes even colic if given for any lengths of time. After large subcutaneous doses, fatty degeneration and exfoliation of the intestinal epithelium usually occurs. There may be an edema of the intestine due to increased capillary permeability.

From the intestine, arsenic passes directly to the liver and is very promptly thereafter excreted in the bile. From the intravenous route, it has been traced in the liver and bile, in the spleen, kidneys and skeletal and cardiac muscles; as well as in the lungs, brain and spinal fluid, and the epidermal regions, including the fur or hair.

A larger amount appears to be excreted by way of the feces than by way of the urine, although the pentavalent forms are more abundantly excreted through the urine than other channels. Since arsenic accumulates even after therapeutic doses, there is always danger of injury to the liver where most of it is stored.

Except in toxic doses, arsenic seems to have no effect on the blood pressure. It appears to be an anti-coagulant and in certain cases hemolytic, though this latter property likely depends upon concentrations as well as composition.

An outstanding pharmacological property of this drug, is its effect on young, growing animals. Used over long periods in such cases, the arsenic causes increased vascularity of the bone marrow with a heightened level of the leucocytic elements, little change in the erythrocytic elements and lessened fat components. In the bloodstream itself, there may be a fluctuation in leukocyte count, but the erythrocytes appear to remain constant in numbers. In over-dosage, this action is reversed. The result is an extensive degeneration of the bone marrow cells and a profound anemia.

After many carefully controlled animal experiments, actual proof is lacking that arsenic can overcome general cases of anemia, though in certain cases it seems to act on some causative agents, as in leukocythemia and pernicious anemias. The use of Fowler's solution (potassium arsenite) as well as the arsphenamines recently have been found to possess the ability of increasing the resistance of the erythrocytes to hemolysis.

On the kidneys, the effects of the arsenicals varies considerably though in therapeutic doses they are only feebly irritant. Some of the compounds select the glomeruli whereas others seem to affect only the tubules. Brown and Pearce have indicated that the suprarenal glands are sensitive to excessive doses of arsenicals and easily become congested and hemorrhagic. There appears to be no effect on adult animal bones, but in growing forms it tends to increase the density of the cancellous areas.

Although the action is not well understood, the arsenicals have long been known to affect beneficially the skin and hair of animals. Frequent small doses are believed to improve the coat of horses, cattle, dogs, etc. According to Osborne, the trivalent forms of arsenic have a special affinity for the vessels beneath the skin papillae; and the pentavalent forms affect the ectodermal structures, hair follicles, sebaceous and sudorific glands. There are, however, along with these beneficial qualities some unwanted effects such as dermatoses, keratoses pigmentation, and sometimes epitheliomata, traceable to arsenical medication.

There is something unusual about arsenic, and that is the tolerance to it that is acquired by animals after long periods of ingestion. Formerly it was believed that anti-bodies are formed gradually in the animal mechanism, but Housmann has shown that the mucous membrane of the digestive tract becomes less penetrable as time goes on. Cloetta found that a dog habituated to a daily, oral dose of 2.6 grains of the trioxide, died when only 1/10 of this amount was given hypodermically. There is great disagreement on this point however, for though some animals build up a resistance within the alimentary tract, others are known to be able to excrete enormous amounts by way of the urine

which is thought to be due to a lowered kidney threshold. Adler and Wetmore have found that increased tolerance to arsphenamine is directly associated with increased rapidity of excretion.

Compounds and Preparations:

A. Trivalent forms:
(Official)—
Arsenic trioxide (arsenous acid) As_2O_3, Solution of arsenous acid (1% arsenic).
Arsenous iodide (AsI_3).
Solution of arsenic and mercuric iodide or Donovan's solution (1% arsenic).
Solution of potassium arsenite or Fowler's solution (1% arsenic).
Arsphenamine (salvarsan) (30% arsenic) or diaminodihydroxyarsenobenzene—HCl.
Neoarsphenamine (neosalvarsan) (20% arsenic) or diaminodihydroxyarsenobenzene methanal sulphoxylate.
(Unofficial)—
Bismarsen (bismuth arsphenamine sulphonate), 13% arsenic.
Mapharsen (hemialcoholate of aminohydroxyphenylarsine-oxide-hydrochloride), 29% arsenic.
Silver arsphenamine (19% arsenic).
Sulpharsephenamine (19% arsenic).

B. Pentavalent forms:
(Official)—
Sodium arsenate (Na_2HAsO_4), Solution of sodium arsenate (Pearson's) 1% arsenic.
(Unofficial)—
Arsacetine (26% arsenic).
Atoxyl (sodium aminophenylarsonic acid) 30% arsenic.
Cacodylic acid ($H(CH_3)_2AsO_2$).
Sodium cacodylate—$Na(CH_3)_2AsO_2$.
Iron cacodylate.

Stovarsol (acetylaminohydroxyphenylarsonic acid) (acetarsone) 27% arsenic.
Tryparsamide (sodium phenylglycinamidearonate) 25% arsenic.
Solarson (ammonium heptenchlorarsonate) 26% arsenic.
Carbarsone (carbamido-phenylarsonic acid) 28% arsenic.
Aricyl (disodium acetic arsonate)

General Therapeutic Uses

The arsenicals are employed along with other drugs such as iron, strychnine or nux vomica as a blood tonic in cases of anemia (though there is doubt as to its value in infectious anemia of horses); in certain nervous conditions such as "chorea" in dogs; as a general tonic for run-down and emaciated animals; in case of heaves of horses; as an anthelmintic to expel round worms in horses (indirect action); to cure certain chronic skin diseases not due to parasitic organisms; and in the treatment of anaplasmosis in cattle.

Creech recommends the use of Fowler's solution in doses of one tablespoonful twice daily (for cattle 6 to 12 months of age if not being milked) where warts are numerous and cover large areas of the body. Fowler's solution is commonly administered internally and applied externally for the treatment of warts in dogs.

The arsphenamines have been demonstrated to be effective in treating contagious pleuro-pneumonia (influenza) in horses. Furthermore, the use of neoarsphenamine has been favorably reported in diseases due to trypanosomiases such as dourine, surra and *mal de caderas*. It is also recommended in infectious keratitis, in primary manifestations of lymphangitis epizootica and in tick fever. The use of stovarsol or acetarsone in the treatment of females for trichomonad infections locally within the vaginal region has been recommended recently. Aricyl has been recommended for simple and pernicious anemia, chlorosis and leukemia, swamp fever, chronic asthma, coughs, roaring following-bronchitis, pneumonia, pleurisy, in the early stages of distemper, in general neuroses, in chronic eczema, scleroderma, ichthyosis, acanthosis, acne and follicular mange. In this varied list of ailments the beneficial action of arsenic is effected in different ways. In the protozoal diseases its action is specific, at least in part; on the filterable viruses it may have, to some degree a similar action; in both these groups and in all the others it has in addition a general tonic effect, a sort of supportive effect to the whole metabolic process thus improving the general health and increasing the animal's capacity to combat the ailment.

The organic arsenicals are replacing the inorganic or arsenous (trivalent) compounds for use in combating cachexia, nutritional disturbances, and severe exhaustion. They are usually less toxic, free from irritation and very rapid in action. Buchanan and Jackson report some good results in cases of follicuar mange in dogs

in a remarkably short period of treatment with disodium-acetic-arsonate (aricyl). A compound of arsenic trioxide (2½%), sulphur, iron sulphate, etc. (called arcidin) has been conveniently administered orally on the grain ration in the treatment of fistulous withers and other chronic suppurating conditions. Neoarsphenamine has also been suggested to be given intravenously in treating influenza, pneumonia and periodic ophthalmia in horses. In the latter ailment its value is doubtful to say the least. There are many glowing reports of the effectiveness of enormous doses of arsenic trioxide in thrush in horses, and to less degree in the treatment of "grease."

Arsenic trioxide has long been a "stand by" of the herdsman for conditioning animals for showing. Its use for this purpose is believed to be responsible for the well known shy-breeding of show animals.

Dose Table

Preparation

Arsenic trioxide:

	Apothecary	*Metric*
H & C	gr. iii—v	.2 —.3
Sh & Sw	gr. 1/10—i	.006—.06
D	gr. 1/60—1/10	.001—.006

(Anthelmintic in horses gr. vii—xv .5—1.)

Solution of arsenous acid (1%);

Solution of arsenous and mercuric iodide (1%)—Donovan's solution;

Solution of sodium arsenate (1%)—Pearson's solution:

Solution of potassium arsenite (1%)—Fowler's solution:

	Apothecary	*Metric*
H & C	ʒii—viii	8. —30.
Sh & Sw	m xv—m xlv	1. — 3.
D	m i—x	.06— .6

(Anthelmintic in horses, Fowler's solution one pint.)

Neoarsphenamine: (To be given three times daily.) (Freshly prepared solutions must be made and intravenously injected into jugular vein of large animals or the ear vein or other superficial vein of small animals.)

	Apothecary	*Metric*
H & C	ʒi—ii	4. —7.5
D	gr. v—x	.3— .6

Aricyl (disodium acetic arsonate):

Small animals—1cc of 1% (1/18 grain arsenic) by intramuscular or subcutaneous injections every other day for five injections; repeated in two weeks if necessary.

Large animals—10cc of 5% (2⅞ grains arsenic) as above except to be repeated in three weeks.

Toxicology

Since arsenic in one form or another is so commonly used on the farms in fruit and vegetable sprays and in dips, it is one of the most frequent causes of accidental poisoning of animals. Paris green as well as lead and calcium arsenate are much used as sprays and are the usual source of the poison. Furthermore, some farmers not knowing the dangers involved use arsenic preparations on the skin of animals, rubbing in the ointment or treating the animal while it is warm. Poisoning has occured from allowing animals access to the dipping solution after cattle or horses have been sprayed or dipped in arsenical solutions. Kinsley reported the death of 200 cattle from using a dipping solution of twice the recommended strength, and Pollack reported cattle poisoned from drinking dipping solution. One must not forget that arsenical poisoning in lactating females affects their young also.

Whether an animal is severely poisoned by a given quantity of arsenic depends upon several factors, such as presence or absence of food in the stomach, the state of the arsenic (if pure, coarsely or finely powdered, or in solution), and whether or not the animal has built up a tolerance from medicinal doses. The usual form of poisoning now-a-days is the acute type; some years ago there were many cases of the chronic form due to smelter fumes that had reached pasture grounds.

In acute cases of arsenic poisoning, usually several animals are affected simultaneously. The onset of the symptoms is sudden, inducing a marked prostration, trembling of the muscles, and staggering gait. Pronounced distress is indicated by rapid breathing, excitability, colic and groaning. Sometimes there is marked salivation followed by vomiting in cattle. At times there is a severe gastro-enteritis with violent purging, the animal grinds its teeth, the pupils may be dilated, pulse and respiration increased, and the temperature normal or elevated. Death sometimes occurs within three hours after the first symptoms, but again may not supervene until several days or a week. On autopsy, the animal

shows signs of severe gastro-enteritis. The gastric mucosa is congested and hemorrhagic and the abomasum or rumen may be perforated by the caustic effect of the arsenic. Gross inspection reveals a normal liver, spleen and kidney; but microscopic examination shows fatty degeneration of these organs.

Treatment consists of administering large quantities of the official arsenic antidote (ferric hydroxide with magnesium oxide), freshly prepared, at frequent intervals. A dose of one to two pints every 15 minutes is recommended. In case this preparation is unavailable, dilute solutions of ferrous sulphate or even ferric chloride are recommended by some since the less toxic iron arsenate is thus formed. There is some doubt as to the effectiveness of the official antidote, and the use of sodium thiosulphate has become somewhat more popular. It should be administered both orally and intravenously. Demulcent drinks such as bismuth subcarbonate or magnesium oxide or milk of magnesia are also necessary to counteract irritation and possible erosion of the mucosa. Furthermore, intravenous saline or glucose solutions, and hypodermic injections of caffeine-sodium-benzoate or camphor-in-oil along with small doses of atropine sulphate to sustain the heart and relieve intestinal colic, aid in sustaining the strength of the hapless, suffering victim.

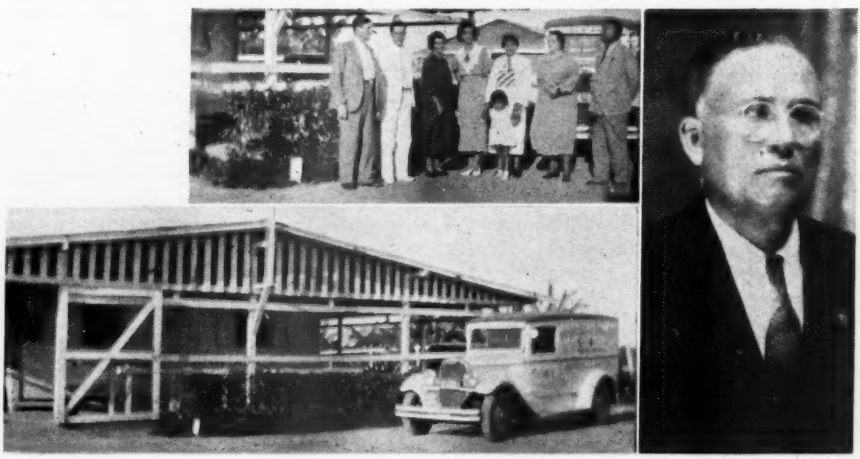
Physical Examinations and Tuberculin Testing

When testing cattle for tuberculosis is an opportune time to make a thorough physical examination of each cow as is possible by observation and palpation; explaining to the owner the seriousness of milking cows with the following pathological conditions present; actinomycosis, carcinoma of the eyeball or any ailment that would be communicable to man.

Climax your advice with some pointers in regard to barn and yard sanitation; milk refrigeration, personal cleanliness of milkers, utensils and cows udders. Explain how this procedure decreases the bacterial count of milk with little additional cost or work, and the better demand for milk that results.

W. B. REDMAN.

Dow City, Iowa.



Above, left: President of the Jockey Club of Puerto Rico; right, Dr. Diaz; center, families of both gentlemen. Doctor Diaz is official veterinarian for the Hippodromes (horse races) in the Island. Below: Doctor Diaz' animal hospital and "ambulancia" at Hato Rey, Puerto Rico. He has a son in the School of Veterinary Medicine, University of Pennsylvania.

Angel Lopez Diaz
Doctor Diaz was graduated in agriculture in 1907 and in veterinary medicine (Ontario), in 1911.

Abstracts

Antitoxin Against Staphylococcus Infection

Staphylococci are capable of forming a number of products of importance in disease, such as leucocidin, enterotoxin, alpha toxin, beta toxin, and probably others.[64] Experimental investigation is making it more and more clear that staphylococcus immunity is antitoxic rather than antibacterial in nature. The treatment of staphylococcus infections can now be carried out on more rational lines than heretofore.

Staphylococcus antitoxin is produced in horses. The animals are injected repeatedly with toxin or toxoid in a form and at intervals which experience has shown to be most suitable. The strength of such sera is expressed as units per cc, the unit being defined in terms of an agreed international standard.

Treatment with specific antitoxin is recommended for such severe and acute infections as osteomyelitis, septicemia, or any toxemic condition caused by staphylococci. In such cases it is necessary to act promptly, and to give the antitoxin intramuscularly. If the acute stage is passed, it is advantageous after a time to continue with a course of toxoid.

Staphylococcus toxoid is used for subacute and chronic infections. They are far more common than the acute cases. Toxoid is prepared by adding formalin in low concentration to the toxic filtrate, and leaving the mixture at 37°F. until it is completely inactivated. Of course, all possible precautions have to be taken that the toxoid is potent. One great advantage of using toxoid is that the progress of treatment can be controlled by measuring periodically the level of antitoxin in the blood. Clinical relapse is associated with a significant fall in the amount of circulating antitoxin, so that by following the blood titre the practitioner may be forewarned and given a chance to stave off a relapse.

These products have been fully tested out in man. Carefully organized trials are needed now to ascertain their value in veterinary practice.

[64] Minett, F. C. 1937. Staphylococcus infections in animals, with special reference to toxoid in preventive and curative treatment. *Vet. Rec.* 49:178-183.

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Difficulties in Diagnosing Plant Poinsoning

In plant poisoning[65] one may meet every symptom that may be evinced in affections of the nervous system, internal organs, muscular system, skin, and even the hoofs. The variety of symptoms, which may be induced not only by different poisons, but also by the same poison taken in varying quantities and under different conditions, is evident. Indeed, the same poison may exert opposite effects on the system, depending on the size of the dose. The symptoms and post-mortem appearances in peracute, acute, subacute, and chronic poisoning with the same toxic substance may differ to a remarkable degree.

A detailed and reliable history is of very great importance in the investigation of suspected cases of poisoning or, for that matter, in the investigation of any disease. The history of an outbreak of disease in live stock is, as a rule, supplied by the owner or the person in charge of the animals concerned. In many cases the unreliable or even untruthful information given by the persons concerned renders a definite diagnosis extremely difficult. The following characteristics of a disease lead one to suspect poisoning: a large number of animals taking ill or dying at the same time; severe purging; occurrence of death soon after drinking. The sudden death of one or a few animals almost invariably should cause one to suspect poisoning. However, it is obvious that the possibility of anthrax should also be considered in such cases. In outbreaks of infectious diseases it is a general, though not invariable, rule that only a few animals take ill at the same time and that more cases follow later.

[65] Steyn, D. G. 1936. Differential diagnosis in plant poisoning. *Jour. S. Afric. Vet. Med. Assoc.* 7:226-237.

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Grasping the trachea in the left hand and shaking it from side to side when passing the stomach tube, determines if the tube is taking the right course.—*W. B. Redman.*

Aujeszky's Disease—Mad Itch

The experiments of the authors[67] with eight viruses of Aujeszky's disease all of different origin show that the differential diagnosis of rabies and "mad itch" cannot be established with certitude from clinical symptoms such as tendency to bite, incubation period, etc., and moreover, they signalize for the first time the spontaneous transmission of the infection by small animals attacking large ones and the possibility of infecting rabbits with the saliva of an infected cow. Dogs, cats, horses, cattle, hogs, sheep, chickens, pigeons, ducks, rabbits, mice and guinea pigs are receptive to the virus.

Peracute Rabies

The author[68] mentions the frequent occurrence of peracute rabies in Indo-China where the abundance of stray dogs creates an exaltation of the virus. Intestinal, paralytic and furious forms are noticed. Owing to the virulence of the virus the evolution of the disease is usually brief, as is also the period of incubation. On this account the disease is easily confused with pseudo-rabies (Aujesky's disease—mad itch) because the clinical symptoms (pruritus) are sometimes regarded as pathognomonic of the latter infection.

Post-mortem examinations, macroscopic and microscopic, are misleading, for if the presence of Negri bodies is an important evidence in favor of rabies, their absence does not signify that the subject was not rabid. The absence of Negri bodies in the nerve centers seems to be related to the rapid evolution of the disease process without paralysis. In three peracute, atypical cases confirmed by inoculation and one experimental case, showing no paralysis, no Negri bodies were found, contrary to their presence in peracute paralytic cases. Moreover, intracerebral inoculations of rabbits with brain substance of peracute cases containing Negri bodies can remain negative. Inoculations of rabbits and guinea pigs with emulsions of the salivary glands gives more constant results.

As a matter of fact, much depends upon the veterinarian's decision, a task of great delicacy and responsibility, which, in the case of doubt should include the recommending of antirabic treatment of persons bitten. The author hopes that the plan of rabies control carried out in North Africa (vaccination) will be authorized in Indo-China.

[67] Gerlach F and Schweinberg, F., 1936. Experimental Researches on Aujesky's Disease (Pseudo-Rabies). Ext. *Revue de Pathologie Comparée* 36:483.

[68] Jauffert, R., 1936. Rage Suraigue. Ext. *Revue de Pathologie Comparée* 36:483.

A Promising Anesthetic

Nembutal anesthesia is most valuable for the performance of somewhat lengthy surgical interferences, such as abdominal operations. However, recovery is too long delayed for the more simple and rapidly performed surgical interferences, such as examinations under anesthesia, radiography and fluoroscopy, simple operations, such as tooth extraction, incision of abscesses, amputation of digits, etc. Full anesthesia for 10 to 15 minutes is quite adequate for the latter operations. It is desirable that the animal shall have recovered completely within an hour, that it may be returned to its owner.

A drug conforming to the foregoing postulates is pentothal sodium.[61] It has, therefore, a very definite place in canine surgery for short operations. The agent is dissolved in sterile water in a strength of 1 grain to 1cc; administration is carried out by slow intravenous injection. In the dog pentothal anesthesia is maintained at its original depth from 5 to 20 minutes, after which time recovery is rapid; the animal is fully conscious again in 30 to 40 minutes.

The method of assessing the degree of anesthesia present is similar to that described for nembutal: inability to raise the head, complete relaxation of the lower jaw and tongue, and depression of the pedal reflex. Wright considers the one-gram ampoule inconvenient; he prefers the drug to be marketed either as a sterile solution or in small capsules.

[61] Wright, J. G. 1937. The use of a new, short-acting barbiturate, pentothal sodium, as a general anesthetic in canine surgery. *Vet. Rec.* 49:27-29.

A Classification of Poisonous Plants

On the basis of chemical groups into which their active principles fall, poisonous plants[66] may be classified as alkaloidal, glucosidal, cyanogenetic, saponinic, phytotoxin, resinoid, oxalic acid, phenolic, and miscellaneous group; the latter comprising those plants, the active principles of which are unique in chemical characters.

Of the alkaloidal plants the most important are the larkspurs. Spontaneous larkspur poisoning is observed principally in cattle. Horses and sheep may also be poisoned under exceptional conditions. The symptoms observed are weakness, depression, trembling and constipation with death from respiratory paralysis. The lupine alkaloids act upon the central nervous system to depress the motor functions. There are differences in the symptoms shown by animals poisoned by different species. On certain lupines sheep exhibit a train of symptoms indicative of nervous stimulation; on other lupines the symptoms are those of depression only. Cattle and horses are depressed.

"The "groundsel" or "ragwort" plants are responsible for certain hitherto obscure intoxications. It is interesting that unlike most alkaloidal intoxications these plants cause a chronic disease called "seneciosis" which is characterized by a parenchymatous hepatitis. Other important poisonous plants in this group are the spotted hemlock, Jimson weed, death camas, and rattle-box.

The glucosidal plants are so named because they contain substances which on hydrolysis yield a sugar. Among the toxic plants in this group are the Ohio buckeye, dogbane, cockle-bur, and the foxglove.

A subgroup of the glucosidal plants are the cyanogenetic plants. Members of this group have the property of evolving or developing hydrocyanic acid under suitable conditions. Species of this type are the flax, wild cherry, and the sorghums. The symptoms exhibited by animals poisoned by cyanogenetic plants are the same as seen in cases of cyanide poisoning. There is a preliminary stimulation of respiration rapidly changing to dyspnea, paralysis of the voluntary muscles with staggering collapse, spasms, complete loss of consciousness, cyanosis of the visible mucous membranes, and death from asphyxiation after a variable period of illness, usually short, but occasionally prolonged. Although hydrocyanic acid is a very rapidly acting poison and so offers little opportunity for the action of remedies, recent work has demonstrated that, if the victim can be reached in time, sodium thiosulphate and sodium nitrite, given intraperitoneally or intravenously, are effective antidotes against rather large doses.

The saponin plants owe their toxic properties to the presence of saponins which differ from other glucosides in that they are usually non-crystalline, soluble in water, forming solutions that foam persistently like soap solutions. The toxic members of this class, corn cockle, rubber weed, bitter rubber weed, act not only through their hemolytic powers but also by a directly depressant action upon the central nervous system, and some cause local lesions in the liver and other parenchymatous organs.

Solanaceous plants owe their toxic character to the presence of a complex substance, solanine which is at once alkaloidal and saponinic, in that, while it contains basic nitrogen and behaves like an alkaloid, it also behaves like a saponin.

Among the plants containing phytotoxin, a substance belonging to the general group of proteins and apparently being a true antigen like the bacterial toxin, are the common black locust, and the cultivated castor bean.

Among the plants containing resinoid, a substance having the physical character of resin, are the water hemlock, whorled milk weed, mountain laurel, and others.

Oxalic acid plants are so named because they contain oxalic acid, usually combined as sodium or potassium oxalate. Important members of this group are the sheep sorrel, sour dock, and greasewood. The leaves of the garden rhubarb often contain

[66] Couch, J. F. 1937. The chemistry of stock-poisoning plants. *Jour. Chem. Educ.* 14:16-30.

enough of this substance to cause poisoning.

A representative of the phenolic plants is the poison ivy. Its toxic principle is identical with urushiol.

Among the plants of which the toxic principle does not fall into any of the well known groups of poison are the loco weeds, white snake root, and sweet clover.

Finally, certain plants, not otherwise toxic, when grown on seleniferous soil, have the ability of taking up sufficient quantities of selenium to render them distinctly toxic to animals (alkali disease).

* * * *

Fractures in the Dog

The exciting causes of bone fractures in the dog[74] may be divided roughly into two groups: gross direct external violence and less severe, often indirect, violence. In the first group, street accidents form by far the commonest causes. The radius and ulna are the bones most often involved, followed closely by the femur and the tibia. In the majority of cases the fracture is complete, sometimes comminuted, sometimes compound, whilst occasionally several bones are involved. Generally, there is considerable displacement of the fragments, and soft tissue injury in addition. The second group is of greater interest, for in these the cause is generally indirect violence of slight severity: a simple slip or fall whilst at play, a fall from a chair, or from the arm of the owner, a force which the bone would probably have withstood, had the muscles associated with it been coördinated. The tibia is the bone most often involved, followed closely by the radius and ulna, and the femur. In the latter, the neck is as often involved as the shaft. In many cases the fracture is subperiosteal or epiphyseal. Fractures due to street accidents occur about twice as often in juvenile as in adult animals. The fracture due to a simple fall is essentially a disease of immature animals in which ossification is not yet complete. Simple accidents in the adult dog are much more likely to result in a sprained joint. In the fore-limb the shoulder and carpus are the common sites; in the hind-limb, the stifle. The humerus is easily fractured in short-legged animals. Injuries to the hip are correlated to age.

The most common complication is that the fracture involves articular surfaces. Veins are frequently lacerated, resulting in hematoma and in edema. Of the nerves injured in the dog, the musculo-spiral is the commonest. Extensor paralysis of a forelimb may accompany fractures of the neck of the scapula or of the shaft of the humerus. Gross fractures of the pelvis may be accompanied by paraplegia due to the displacement of the sacrum. Often some vital soft tissue is, or becomes, damaged.

Wright is of the opinion that the great majority of cases of severe lameness caused by injuries are due to lesions of bones or joints, and care should be taken not to dismiss a case with the diagnosis of sprain until a very careful examination has been carried out. It may be wise to delay detailed examination for 24 hours until much of the shock and pain have subsided. At any rate no opinion should be expressed until a very careful manipulation of the limbs has been carried out. All the bones should be palpated for localized pain, subperiostal swelling and bending on pressure. All joints should be flexed and extended. The symptoms of fracture of the pelvic floor may be confused with the locomotor incoördination of canine distemper. Radiography and fluoroscopic screening are invaluable aids not only to the diagnosis of fractures but to effective reduction and setting. Too great stress cannot be placed on the necessity for radiographing the bone in two planes whenever possible; otherwise, superimposition may cause confusion.

The treatment of closed fractures comprises correction of the deformity which has resulted from the break in the bony skeleton. Without recourse to radiography effective reduction may be difficult. Simple traction on the limb is often insufficient to reduce displacement. The oldest and most frequently employed method of setting a fracture is the immobilization of the limb by means of a padded splint, held in posi-

[74] Wright, J. G. 1937. Some observations on the incidence, causes and treatment of bone fractures in the dog. *Vet. Rec.* 49:2-10.

tion by an encircling bandage. This method has several disadvantages. A more satisfactory treatment of fractures in the dog is by the use of the unpadded plaster cast. The plaster is applied in slabs, and not as an encircling bandage. It is applied lightly and carefully molded to the skin, taking care to avoid creases. By attaching itself to the hairs it holds more firmly. After the cast is applied the position of the limb should not be altered until setting has occurred, otherwise creases and pressure points may form. During the first 48 hours, after the application of the cast, the extremity of the limb must be observed carefully, and if it becomes markedly swollen or cold, or if sensation is lost, the plaster must be split at once. The main principles of the method are that having replaced the displaced segments, immobilization is effected, with the joints in a position midway between flexion and extension to overcome tension, by the application of an unpadded plaster of Paris cast. By this means the pressure is disposed evenly over the whole of the enclosed surface, and an effective ecto-skeleton is formed to replace the broken endoskeleton.

The Treatment of Glanders in Horses

The author[70] has prepared biological products under the name of anabacterins—the autolysats of bacteria detoxified with formalin and heat. The method applied to the bacillus of glanders enabled him to produce an anti-glanders remedy with which he was able to cure even clinical cases of that disease. Injected into healthy horses or horses that once reacted to mallein and then recovered, there is no local nor general reaction. In horses affected with glanders on the contrary the local and general reactions are intense, which diminish gradually in a series of treatments given at intervals of 48 hours for 30 days. In the course of the treatment of horses that have reacted to the mallein test, cutaneous lesions, from which the bacillus can be isolated, make their appearance. In clinically affected horses one may observe periostites, ochidites or epistaxis but these lesions cicatrize in eight days. The author treated 12 clinical cases and more than a 100 non-clinical cases in Asia. All of the clinical cases were returned to work after a treatment of six weeks.

[70] Legroux, R., 1936. Traitment de la Morve des Equidés. *Recueil de Médecine Vétérinaire*, 112:12.

Vitamins in Surgical Pathology

The authors[75] appraise the importance of vitamins in surgical pathology, discussing three problems: Tumors, infection and regeneration. If vitamins play no part in the generation of tumors they nevertheless participate in their proliferation. New researches have shown that A-avitaminosis contributes not only to metaplasia but also to the proliferation of epithelium. In the course of similar studies Caspari showed that B_1-avitaminosis inhibits the growth of tumors. In aged subjects there is an intense destruction of growth vitamins. If this physiological process of degradation is inhibited, the cells receptive to excess of vitamins give birth to proliferations of a malignant type. The research shed light on the etiology of tumors.

Insulin in Dogs

Normal dogs are not very sensitive to the action of insulin,[76] not even when the blood sugar level is reduced to 30 or 40 milligrams per cent.

Fourteen dogs subjected to hypophysectomy, however, showed marked sensibility to insulin. The shock was then fatal. The removal of the pancreas from hypophysectomized dogs is followed by glucosuria, but the subjects survived longer than those which still possessed their pituitary gland after the pancreas was removed. These experiments show a close correlation between the pituitary gland and the pancreas.

[75] Lauber. 1937. Vitamins as treatment in surgical pathology. Abs. *Annales de Médecine Vétérinaire*. 82:1.

[76] Karlik, L. R. 1937. Abs. *Annales de Médecine Vétérinaire*. 82:1.

Book Reviews

Dogs, Their Care and Training, Breeds, and Selection. By Alfred W. Meyer, D.V.M. 268 pp.; illustrated. Published by Whittlesey House, New York, 1936. Price $2.50.

While the possession of a dog is a source of satisfaction to the owner, it confers upon him also a definite responsibility to insure reasonable comfort and happiness to his ward. Certainly no one has a better knowledge of the pitfalls of dog keeping by the average American, than the veterinarian, or is the better fitted to give competent advice to dog lovers. By a firmly established precedent, books written on the care and management of dogs contain formulas and prescriptions for treatment of ailments. The book under review is no exception to this rule. However, the prescriptions given are few although in most instances the drug recommended for use in the condition under discussion is stated. The degree to which this may induce owners of dogs to attempt treatment without an expert diagnosis or adaptation of the treatment to individual requirements is problematic.

Doctor Meyer's book is subdivided into 22 chapters as follows: selecting a dog—breeds of dogs—the dog as an individual—the origin of the dog—nutrition—the puppy in health and sickness—the care of the dog in health and sickness—first aid measures—diagnosis, treatment, surgery—skin diseases, non-parasitic and parasitic—internal parasites—diseases of the mouth—diseases of the eye, ear, nose—ductless glands, diseases of metabolism, rheumatism—the reproductive organs—respiratory and heart diseases—diseases of the digestive system—diseases of the nervous system—liver and kidney diseases, toxemia—distemper and rabies—breeding—dog shows.

The subject of nutrition is discussed in 21 pages. One must say it evidences some lack of familiarity with recent developments and does not attain the scientific plane on which the discussion of diseases is presented. Even in the discussion of disease the author sometimes slips from fact to imagination as in the thesis on "acid milk."

A Book of Famous Dogs. By Albert Payson Terhune. With drawings by Robert L. Dickey. Cloth. 300 pages. Price $2.75. Doubleday, Doran & Co., New York.

No book about dogs by Terhune needs an introduction. His many dog chronicles have been followed with interest by an ever-increasing audience for many years. In this latest volume he has tapped the centuries for dog lore and presents these stories—all true of course, in an entertaining manner.

We find a variety of canine qualities covered although Mr. Terhune has not become sentimental in this chronicle, and not all the dogs in it are heroes. On the other hand, this collection of historically famous and plain run-of-the-mill dogs includes many tales which show the unselfishness and loyalty of dog nature as well as intelligence, vanity, and freakish temperament.

—*H. J. Mostyn.*

The Dog Owner's Manual. By Josephine Z. Rine, editor of Popular Dogs. Price $5.00. Cloth. 440 pages. Illustrating all A.K.C. recognized breeds. Coward-McCann Inc., New York.

This is the seventh book on dogs from the pen of this author. To cover the whole story of the dog, and give as much sound information as this volume contains is no mean task. It is meant to appeal to the novice but comprises a wealth of information that should refresh and benefit the "expert" on the subject of methods of training, care, breeding and "home treatment."

As few dog owners are competent to make use of some of the advice as to what to do in case of sickness, which most recent books on the subject of dog care written by veterinarians contains, the chapter on Diseases and Ailments is a refreshing departure from the pseudo advice that most lay authors attempt to give. However, the author was unable to stop with the best thesis ever written for the benefit of the dog and the owner: "Consult your veterinarian in case of sickness."

The book may be read with profit not only by dog owners, but one ventures to predict by veterinarians, a little weak in their knowledge of such subjects as "Obedience Work," "Bench Show," "Field Trials" and points of the breeds.—*H. J. M.*

The Pet Manual, by Dr. J. M. Vernon. 64 pages. Price fifty cents Published by The Pet Manual, Des Moines, Iowa, 1937.

The author has condensed in this booklet the experience of 30 years of answering questions about pets. While, obviously, the material is not new to the small animal practitioner, nevertheless, the pamphlet should prove to him an every ready and handy reference when answering similar questions put to him by his clients.

The following subjects are discussed: Choosing a pet; feeding; housing; training; breeding; raising puppies; showing; bathing; muzzling; trimming ears and docking clipping or plucking; dew claws; character; unpleasant characteristics; dog days; rabies; distemper; poison; rectal pouches; car sickness; gun shot wounds; cats; birds; ponies; goats; burros; monkeys; deer; spaying; castrating; mange; tartar; parasites; house breaking; shipping pets; destroying pets.

The discussions are conservative, but the author does not hesitate to assail cherished superstitions.

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Horses and Riders. 24 pages; profusely illustrated. Price ten cents. Published by the Horse and Mule Association of America, 407 S. Dearborn St., Chicago, Ill.

"This booklet has been prepared in answer to thousands of inquiries that have come to the secretary of the Horse and Mule Association of America. It is intended primarily for children from ten to sixteen years of age, and for adults who have lately begun to ride, but who have not the knowledge which comes from lifelong association with good horses and horsemen. There is much in it, however, that will be of interest and benefit to experienced horsemen."

Some of the subjects discussed in this pamphlet are: Advantages of riding; picking the mount; clothes for riders; saddles and bridles; learning to ride; manners; care of mounts; shoeing; feed; salt and minerals; water; stables; riding trails; games for riders.

Veterinarians who wish to encourage good riding may well order this booklet in quantities for distribution to their clients.

Dogs for Profit, by Rowland Johns and Leonard Naylor. Line bound, 471 pages, 100 illustrations. Price $5. E. P. Dutton & Co, Inc., New York.

Rowland Johns, co-author, is author of "Our Friend the Dog" series among his other writings on the subject of the dog. The photographs for this work were made by R. W. Tauskey, official photographer to the American Kennel Club. Foreword by Freeman Lloyd, Kennel Editor of *Field and Stream* and Contributing Editor to the *American Kennel Gazette.*

Three hundred and forty-seven pages are devoted to the description of "breed standards" and photographs of ninety-two of the breeds recognized by the American Kennel Club. This section, of course, is a duplication of what may be found in "Pure Bred Dogs."

The first 125 pages are written in an easy style but deal for the most part with general principles. It roughly outlines, for the novice, a few of the basic rules in attempting to make a profit from dogs and suggests a few avenues for possible revenue in conducting a boarding kennel, a training establishment or a canine beauty parlor. The chapter on diagnoses and remedies for the "common" ailments lists 35 such and recommends for most of them the services of a "veterinary surgeon."

No one knows all there is to be known about dogs, but "Dogs for Profit" does not contribute a great deal, even to the novice, in furthering this knowledge.—*H. J. Mostyn.*

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Anesthetics in Fowl

The narcotics used in mammals have an inconstant action in fowl.[77] The variations are pronounced and not being related to age, breed or condition of health, most of the narcotics are not usable in fowl. This applies to chloral, morphine, barbital, etc., which are narcotic only in toxic doses. Others have no narcotic action at all even in mortal doses.

[77] Hromadkova. 1937. Contribution to the study of narcotics in fowl. Abs. *Annales de Médecine Vétérinaire,* 82:1.